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FACTS IN FAVOR OF COMPULSORY RETIREMENT.[1]

THE liability of the citizen to military service was limited by the Roman law between the ages of seventeen and forty-five. No time was fixed when officers should quit the legions; but general as well as Roman history leaves no room to doubt that the greatest commanders, like the best private soldiers, in all armies and countries have been found below the age of forty-five.

As examples:

Philip of Macedon ascended the throne at twenty-two, was the conqueror of all Greece at forty-five, and died at forty-seven.

Alexander the Great defeated the celebrated Theban band at Cheronea before arriving at the age of eighteen, ascended the throne at twenty, had conquered the world at twenty-five, and died at thirty-two.

Julius Cæsar commanded a fleet before Mitylene and distinguished himself before the age of twenty-two; completed his first war in Spain and was made consul before the age of forty; conquered Gaul, twice crossed the Rhine, and twice invaded Britain before the age of forty-five; won the battle of Pharsalia and obtained supreme power at fifty-two. He died at fifty-six the victor of five hundred battles, and the conqueror of one thousand cities.

[1] The facts on which this article is based have been a long time in the possession of the writer, and were collected with the intention of publishing them a year or two hence in a work on the Military Policy of the United States.

The recent introduction of a bill in the House of Representatives to make retirement compulsory at sixty-two years of age having renewed the interest of the army on this subject, the facts are now made public in the hope that their presentation may prove a benefit to the service.

Hannibal was made commander-in-chief of the Carthaginian army in Spain at twenty-six, and had won all his great battles in Italy, concluding with Cannæ, at thirty-one.

Scipio Africanus, the elder, distinguished himself at the battle of Ticinus at sixteen, and at twenty-nine overthrew the power of Carthage at Zama.

Scipio Africanus, the younger, had conquered the other Carthaginian armies and completed the destruction of Carthage at thirty-six.

Genghis-Khan achieved many of his victories and became emperor of the Moguls at forty.

Charlemagne was crowned king at twenty-six, was master of France and the larger part of Germany at twenty-nine, placed on his head the iron crown of Italy at thirty-two, and conquered Spain at thirty-six.

Gonsalvo de Cordova, the Great Captain, had gained a great reputation and was made commander-in-chief of the army of Italy at forty-one.

Henry IV., of France, was at the head of the Huguenot army at sixteen, became King of Navarre at nineteen, overthrew his enemies and became King of France before the age of forty.

Montecuculi, at the age of thirty-one, with two thousand horse, attacked ten thousand Swedes and captured all their baggage and artillery; gained the victory of Triebel at thirty-two; defeated the Swedes and saved Denmark at forty-nine; and at fifty-three defeated the Turks in the battle of St. Gothard.

Saxe was a *maréchal-de-camp* at twenty-four, marshal of France at forty-four, and at forty-nine gained the famous victory at Fontenoy.

Vauban, the great engineer, had conducted several sieges at twenty-five, was *maréchal-de-camp* at forty-three, and *commissaire-général* of the fortifications of France at forty-five.

Turenne, passing through the grades of captain, colonel, major-general, and lieutenant-general, became a marshal of France at thirty-two, and won all his distinction before forty.

The great Condé defeated the Spaniards at Rocroi at twenty-two, and won all his military fame before the age of twenty-five.

Prince Eugene, of Savoy, was colonel at twenty-one, lieutenant-field-marshal at twenty-four, and shortly after general-field-marshal. He gained the battle of Zenta at thirty-four, and co-operated with Marlborough at Blenheim at forty-one.

Peter the Great, of Russia, was proclaimed czar at ten years of age, organized a large army at twenty, won the victory of Embach at thirty, founded St. Petersburg at thirty-one, and died at the age of fifty-five.

Charles XII. completed his first campaign against Denmark at eighteen, overthrew eighty thousand Russians at Narva before nineteen, conquered Poland and Saxony at twenty-four, and died at thirty-six.

Frederick the Great ascended the throne at twenty-eight, terminated

the first Silesian war at thirty, and the second at thirty-three. Ten years later, with a population of but five millions, he triumphed over a league of more than one hundred millions of people.

Cortes effected the conquest of Mexico and completed his military career before the age of thirty-six.

Pizarro completed the conquest of Peru at thirty-five, and died at forty.

Lord Clive distinguished himself at twenty-two, attained his greatest fame at thirty-five, and died at fifty.

Wolfe was conqueror of Quebec at thirty-two.

Napoleon was a major at twenty-four, general of brigade at twenty-five, and commander-in-chief of the army of Italy at twenty-six; achieved all his victories and was finally overthrown before the age of forty-four.

The age of his generals and marshals was not less surprising. Dessaix was a general of brigade at twenty-five, a general of division at twenty-six, and died at thirty-two. Massena was a general of division at thirty-five. Soult was a second lieutenant at twenty-two, captain at twenty-four, and, passing through the grades of major, colonel, and general of brigade, became a general of division at twenty-nine. Davoust was a second lieutenant at seventeen, general of brigade at twenty-three, and general of division at twenty-five. Eugene Beauharnais was a major at nineteen, colonel at twenty-one, general of brigade at twenty-three, and Viceroy of Italy at twenty-five. Saint-Cyr was a general of brigade at twenty-nine, and general of division at thirty. Suchet was a brigade commander at twenty-five, and a corps commander at twenty-eight. Oudinot was a general of brigade at twenty-five, and general of division at twenty-eight. Ney was a general of brigade at twenty-seven, and general of division at twenty-nine. Lannes was colonel at twenty-seven, general of brigade at twenty-eight, and soon after general of division. Joubert was adjutant-general at twenty-five, general of brigade at twenty-six, general of division at twenty-eight, general-in-chief of the army of Italy at twenty-nine, and died at thirty. Victor was a major at twenty-seven, general of brigade at twenty-nine, and general of division at thirty-two. Murat was a lieutenant at twenty, general of brigade at twenty-five, and general of division at twenty-seven. Mortier became a general of brigade at thirty, and general of division at thirty-one. Macdonald was a colonel and general of brigade at twenty-seven, and general of division at thirty. Marmont was a captain at twenty-one, general of brigade at twenty-four, and general-in-chief of an army at thirty-two. Bernadotte was a colonel at twenty-eight, general of brigade at twenty-nine, and general of division at thirty. Lefebvre was general of brigade at thirty-eight, and general of division at thirty-nine. Bessières was a colonel at thirty, general of brigade at thirty-

two, and general of division at thirty-four. Duroc was a colonel and general of brigade at twenty-seven, general of division at thirty, and died at forty-one.

On ascending the throne, Napoleon nominated eighteen generals to be marshals of France. Their mean age was forty-four. He afterwards nominated seven more, whose mean age was forty-three. These appointments were regarded as rewards for past services, as several of the old marshals were never called into the field after their promotion.

By way of contrast, the opponents of Napoleon were distinguished by their advanced age.

In the campaigns of 1796, in Italy, Beaulieu and Wurmser were octogenarians, while Alvinzi was over seventy. All had distinguished themselves in early life, but had lost the energy and resolution required of a military commander.

In the Marengo campaign,—1800,—Melas, the Austrian commander, was a soldier of more than fifty years' service, who had distinguished himself in the Seven Years' War.

In the campaign of 1805, Mack was fifty-three, and Kutusoff sixty. The plan of campaign they were directed to execute was drawn up by the still more aged generals of the Aulic Council.

In the Jena campaign of 1806, which, for the time being, totally destroyed the military power of Prussia, Napoleon at thirty-five was opposed by the Duke of Brunswick, seventy-one; Hohenlohe, sixty; Mollendorf, Kleist, and Massenbach, all old generals of the time of Frederick the Great. Jomini spoke of them as "exhumed from the Seven Years' War,—whose faculties were frozen by age,—who had been buried for the last ten years in a lethargic sleep."

In the campaign of 1807, the French were opposed by Kamenski, eighty years of age, Benningsen, sixty; and Buxhowden, fifty-six.

At the opening of the campaign of 1812, which proved so fatal to Napoleon, the Russians were guided by the counsels of younger men. The Emperor Alexander was thirty-five years of age; Kutusoff, the nominal commander-in-chief, was supported by Barclay de Tolley and Miloradowich, forty-nine; Wintzengerode, forty-three; Schouvalof, thirty-five; and the Archduke Constantine, thirty-three years of age.

In the campaign of 1814, the Austrians were led by Schwartzenburg, about thirty years of age; the Prussians by Yorck, Bulow, and Blücher. The latter, advanced in life, was guided in nearly all his movements by younger men, like Scharnhorst and Gneisenau.

In the Waterloo campaign Wellington controlled the movements of the English, while Gneisenau, the chief of staff of Blücher, planned the operations of the Prussians. Both were about the age of Napoleon, and younger than many of his generals, whose energy and skill were rapidly declining.

In the war of 1812 gray hairs made the generals. In speaking of

our disasters, General Halleck, from whose work on Military Art and Science many of the foregoing facts have been quoted, states: "In the American war of 1812 we pursued the same course as Austria, Prussia, and Russia in their earlier contests with Napoleon,—*i.e.*, to supply our armies with generals we dug up the Beaulieus, the Wurmsers, the Alvinzis, the Melases, the Macks, the Brunswicks, and the Kamenskis of our Revolutionary war; but after we had suffered sufficiently from the Hulls, the Armstrongs, the Winchesters, the Dearborns, the Wilkinsons, the Hamptons, and other veterans of the Revolution, we also changed our policy, and permitted younger men—the Jacksons, the Harrisons, the Browns, the McReas, the Scotts (Scott had acquired his military reputation and attained the rank of major-general at twenty-eight), the Ripleys, the Woods, the McCombs, the Wools, and the Millers—to lead our forces to victory and to glory. In the event of another war, with any nation capable of opposing to us anything like a powerful resistance, shall we again exhume the veterans of former days, and again place at the head of our armies respectable and aged inefficiency; or shall we seek out youthful enterprise and activity combined with military science and instruction? The results of the war, the honor of the country, the glory of our arms, depend, in a great measure, upon the answer that will be given to this question."

These deductions should not surprise us. War is not a sedentary profession. The usefulness and endurance of the private soldier are determined by his physique. The usefulness of an officer depends upon his mental, moral, and physical powers. When these are in conjunction he reaches his climax as a commander. In proportion as one or all begin to fail, in the same proportion must the skill and capacity of the commander decline.

It is well known in civil life that few doctors, lawyers, merchants, or bankers acquire wealth or distinction who have not laid the foundation of their success before forty. The reason is obvious. The age of man between twenty and forty is the age of aggression. It is during this period that he likes to encounter obstacles for the pleasure of vanquishing them. The stock board of any great city is a Babel of young brokers, whose plans, already stretching across a state or a continent, aim to encircle the world.

In an army in time of peace, the skill, courage, energy, and ceaseless activity, which in civil life are given full scope before forty, are drowned in the turbid stream called promotion. The young officer ambitious to lead an assault, or a charge, waits in vain for a chance. The sluggish current which bears him onward to positions of responsibility, bears with it the physical disability, if not superannuation, which are always fatal to command.

At the beginning of the Florida war nearly all the field-officers of the line were old and decrepit. The complement was three to each

regiment. The number of companies in each regiment was nine in the artillery, and ten in the infantry and dragoons. In June, 1836, as reported by the adjutant-general, there were serving in Florida twenty-six companies of infantry and artillery, whose complement of field-officers was eight; the number present was seven. By September the number of companies was increased to thirty-one; the complement of field-officers was nine; the number present was three. In December the number of companies was forty; the number of field-officers should have been twelve; the number present was seven.

In the Creek war, which broke out the same year, the absence of field-officers was equally conspicuous. The number of companies serving in June was sixteen; the complement of field-officers was five; the number present was three. Of the thirteen captains present, "five were on higher duty as commanders of battalions, acting as inspectors, or performing other important duties as field-officers with the troops in the field." This report was called for by a resolution of Congress, in February, 1837, and was submitted by the Secretary of War on the 1st of March.

The return for October, 1836, shows that the First Artillery, with its nine companies in active service, had but one field-officer present; in the Second Artillery there was one field-officer with seven companies; in the Third Artillery, two field-officers with eight companies. The Fourth Artillery, seven companies, and the Fourth Infantry, eight companies, were wholly destitute of field-officers. The Marines, who had volunteered for the war, numbered six companies, with three field-officers, two of whom were detached to command the Fourth Artillery and Fourth Infantry.

As a partial remedy for the absenteeism of the superior officers of the line, General Macomb, the general-in-chief, in his annual report for 1837, submitted a plan of retirement. To avoid the objection of expense, he proposed that any colonel of a regiment having served thirty years, who felt unfit for field service, should be permitted to retire on full pay, the officers thereby promoted not to draw the full pay of their new grade until after his death. This plan, which, in applying only to colonels, but partially met the evils from which the army was suffering, would have increased the rank and command of a few younger and more vigorous officers, but until the death of their superannuated colonel they would have had to content themselves with the pay of the grade next below. The recommendation, whatever its objections, was supported by returns dated November 30, 1837, which showed that there were seventy-seven companies of infantry, artillery, and cavalry serving in Florida, entitled to a complement of twenty-four field-officers, of whom but fourteen were present. In the four regiments of infantry there was but one colonel for duty; the four regiments of artillery had none.

No action having been taken by Congress, the condition of the army at the beginning of the Mexican war was the same as in 1836. Few of the field-officers were able to accompany their regiments. Buena Vista, the glory of the volunteers, was won under regimental leaders like Hardin, Davis, McKee, and Clay. Short enlistments having reduced the volunteers in Scott's army after Cerro Gordo to four regiments, numbering for duty but fifteen hundred and eighty men in a total force of eleven thousand and fifty-two, the victories of Contreras, Churubusco, Chapultepec, and El Molino del Rey, like the opening battles of Palo Alto and Resaca de la Palma, were of necessity the glory of the regular army.

The rank of the officers commanding the old regiments in the brilliant battles in the valley of Mexico was as follows: First Artillery, a brevet major; Second Artillery, a major; Third Artillery, a captain; Fourth Artillery, a major; Second Infantry, a captain; Third Infantry, a captain; Fourth Infantry, a major; Fifth Infantry, a brevet colonel; Sixth Infantry, a major; Seventh Infantry, a lieutenant-colonel; Eighth Infantry, a major. The two battalions of cavalry, composing Harney's brigade, were commanded one by a major, the other by a lieutenant-colonel.

From the above it appears that in eleven regiments of infantry and artillery of the old army there were no colonels present, and but one lieutenant-colonel; the other ten regiments being commanded by captains, majors, or brevet field-officers.

The injustice of requiring young officers to exercise high command in battle without giving them corresponding rank and pay did not stop with the war. The widows and families of such as were killed were compelled to accept the pension due to the actual rank of a captain or lieutenant, although the husband and father at the time of his death might have been discharging the duties of an absent colonel. The latter, by contrast, incapacitated by age, remained at home with his family on full pay, awaiting only the return of peace to be restored to the full honors of command.

The absenteeism of field-officers during the Florida and Mexican wars is easily explained. In the line of the army up to this time there were but four principal causes of promotion, viz., death in battle, death from disease, resignation, and dismissal. There was also an occasional movement through promotions to the staff, and to such regiments of dragoons and infantry as from time to time were added to the military establishment.

The following tables show the rate of promotion of a few of the field-officers of the three arms of service between the years of 1838 and 1860, only such officers being selected as passed through all the grades from second lieutenant upwards.

ARTILLERY.

Name.	Regiment.	Second Lieutenant.	Number of Years' Service before being promoted to			Age when appointed Major.
			Major.	Lieut.-Col.	Colonel.	
William Gates . . .	3d	March 6, 1806.	26	30	39	...
F. S. Belton	4th	March 27, 1812.	26	33	45	48
John Erving	2d	Jan. 9, 1809.	32	37	48	54
Levi Whiting	1st	Feb. 10, 1812.	30	38	...	52
C. S. Merchant . . .	3d	March 11, 1814.	35	43	...	57
Justin Dimick	2d	July 1, 1819.	31	38	...	53
G. Naumann	3d	July 1, 1823.	30	...	...	52
W. W. Morris . . .	4th	July 1, 1820.	33	...	...	55
Martin Burke	2d	Jan. 28, 1820.	36	...	...	58

The average number of years' service of all the field-officers of artillery who were commissioned between the years 1838 and 1860, and went through all the grades, was as follows:

Before promotion to major	30 years.
" " " lieutenant-colonel	35 "
" " " colonel	41 "

When not individually known, the age before promotion to major in the above table, as well as in all the following computations, is based on the supposition that the average age of such as were cadets was eighteen years at date of admission, and twenty-two years on graduation.

INFANTRY.

Name.	Regiment.	Second Lieutenant.	Number of Years' Service before being promoted to			Age when appointed Major.
			Major.	Lieut.-Col.	Colonel.	
Gus. Loomis	5th	March 1, 1811.	27	29	40	49
William Whistler . .	4th	June 8, 1801.	25	33	44	...
Newman S. Clarke . .	6th	March 12, 1812.	22	26	34	...
E. A. Hitchcock . . .	2d	July 17, 1817.	21	25	34	43
Jos. Plympton . . .	1st	Jan. 8, 1812.	28	34	41	50
E. Backus	3d	July 1, 1824.	26	35	...	48
G. I. Rains	...	July 1, 1827.	24	33	...	...
William Hoffman . .	6th	July 1, 1829.	22	31	...	44
E. R. S. Canby . . .	10th	July 1, 1839.	16	...	...	38
S. Burbank	2d	July 1, 1829.	26	...	...	48
Isaac Lynde	7th	July 1, 1827.	28	...	...	50

The average number of years' service of all the field-officers of infantry who were commissioned as such between 1838 and 1860, and who went through all the grades below, was as follows:

Before promotion to major	24 years.
" " " lieutenant-colonel	29 "
" " " colonel	35 "

CAVALRY.

Name.	Regiment.	Second Lieutenant.	Number of Years' Service before being promoted to			Age when appointed Major.
			Major.	Lieut.-Col.	Colonel.	
R. B. Mason	1st	Sept. 2, 1817.	16	19	29	...
W. S. Harney	2d	Feb. 13, 1818.	...	18	28	...
E. V. Sumner	1st	March 3, 1819.	27	29	36	...
Enoch Stein	...	July 16, 1832.	21	...	...	...
C. A. May	2d	June 8, 1836.	19	...	...	41
John Sedgwick	1st	July 1, 1837.	18	...	...	40

The average number of years' service of all the field-officers of cavalry who were commissioned as such between 1838 and 1860, and who went through all the grades below, was as follows:

Before promotion to major	19 years.
" " " lieutenant-colonel	23 "
" " " colonel	31 "

The difference in promotion in the three arms is partly explained by the date of organization of the different regiments.

In the artillery and infantry, promotion was retarded by several reorganizations. The First Artillery went back, through the reorganization of 1821, to the light artillery of 1808; the Second, Third, and Fourth Artillery went back, through the reorganizations of 1821 and 1814, to 1802.

The regiments of infantry from the First to the Seventh, inclusive, went back through the reorganization of 1815: the First to 1790; the Second to 1791; the Third and Fourth to 1796; the Fifth, Sixth, and Seventh to 1812. A few promotions, *per contra*, were made by the organization of the Eighth Infantry in 1838, and the Ninth and Tenth in 1855.

All the officers of cavalry selected from the infantry and artillery were advanced at least one grade on receiving their nomination. The First Cavalry (First Dragoons) was organized in 1833; the Second (Second Dragoons) in 1836; the Third (Mounted Riflemen) in 1846; the Fourth and Fifth (formerly First and Second Cavalry) in 1855.

The foregoing tables only indicate the rate of promotion up to the rank of colonel. The number of years' service of any particular officer up to any given year must be sought in the army registers. From the one for January, 1861, it appears that the average number of years'

service of the four colonels of artillery was fifty-one; the four lieutenant-colonels was forty-six; the average age of the four colonels was seventy-three; the four lieutenant-colonels, sixty-eight. The average number of years' service of the ten colonels of infantry was forty-four; lieutenant-colonels, thirty-six; average age of colonels, sixty-six; lieutenant-colonels, fifty-eight.

Strange as it may appear, the rate of promotion among the field-officers was scarcely affected by the five years' war in Florida subsequent to 1838, or by the Mexican war, which lasted two and a half years. The reason was that the veterans of the war of 1812 were too old to participate in either. As a consequence, promotion on account of exposure in campaign or death on the battle-field fell within the grades of major and below.

The condition of the general staff and administrative departments of the army in 1861 was no better than that of the line. All the generals, save one, entered the service before 1818, while among the twenty-one colonels and lieutenant-colonels of the nine different corps and departments, there were but six whose original entry into service was subsequent to 1820.

The moment the country was confronted by the perils of civil war, the lethargic, if not moribund, state of the army excited the attention of Congress. In the debates of July 13, 1861, relative to the increase of the regular army, Mr. Wilson, chairman of the Military Committee of the Senate, said, "This army of ours is paralyzed towards the head. Your ablest officers are young captains and lieutenants; and if I wished to-day to organize a heavy military force, such as we are calling into the field, I would abolish the army as the first act, and I then would take officers from the army and place them where their talents fit them to go, without reference to the rank they occupied in the old regiments."

The sense of Congress on a subject of such vital importance was expressed in the laws of August 3, 1861, and July 17, 1862. By the terms of the first law, any officer who had served forty consecutive years could upon his own application be placed on the list of retired officers. In case the brevet lieutenant-general retired, he was to receive his full pay and allowances. Other officers "incapable of performing the duties of their office," whether from "long and faithful service, wounds, injury received in the line of duty, sickness or exposure," could be retired with their pay proper and four rations per day. If the cause of incapacity was not incident to the service, the officer could receive one year's pay and allowances and be dropped from the rolls; but in no case could an officer be retired by the President except upon the report of a board, the members of which were sworn to an impartial discharge of their duties. The number who might be retired was limited to seven per centum of the whole number of officers in the army.

The second law looked particularly to the evil of superannuation. It prescribed that whenever the name of an officer had been borne on the rolls of the army forty-five years, or he had attained the age of sixty-two, it should be "in the discretion of the President to retire him from active service."

Through the option unfortunately given to the President, the second law, even during the war, could not be uniformly and justly applied. Sedentaryism, it was soon found, was as prejudicial in the staff as in the line. Nevertheless, respect for the personal feelings of many officers who had rendered eminent service during the preceding half-century caused the government to avail itself but sparingly of the advantages offered by the law. The commissary-general of subsistence, who entered the service in 1808, died in September, 1861, before the law of 1862 took effect. His successor, who entered in 1813, remained on the active list till his death, in 1864. The surgeon-general, who entered the service in 1818, retired on his own application in 1862. Two paymaster-generals, one of whom entered the service in 1813, the other in 1822, passed off the active list before the close of 1864; the latter retired by his own application. The chief of engineers, who entered in 1805, was carried on the active list till his death, in 1864. Two chiefs of ordnance were retired before the close of 1864, one of whom entered the service in 1814, the other in 1820.

These facts relative to the staff establish not the injustice of the law, but the injustice of its application. Some chiefs, regardless of their age, were kept on the active list till their death, while others much younger were invited, or without consulting their wishes were forced, to retire.

The operations of the two laws, however, will best be illustrated by reference to the retirements which were made from time to time during the progress of the war.

Under the forty-year clause of the first law the veteran general-in-chief, the hero of the war of 1812 and the conqueror of Mexico, retired on his own application, November 1, 1861. Two colonels of artillery, one colonel of infantry, and one major of artillery were retired in the same manner on or before the same date. No applications came from the staff. The same year the number of officers of over forty years' service who were retired "for incapacity," etc., was one colonel and one major of infantry, two colonels and one lieutenant-colonel of the staff.

In 1862, among officers of over forty years' service, there was but one voluntary retirement, while for incapacity there was none.

In 1863 there was one voluntary retirement, and one for incapacity.

It thus appears, whether through a desire to be employed or the more natural disinclination to accept lower pay, that only seven officers

voluntarily applied to be retired up to the 1st of August, 1863, two years after the passage of the first law. As the consequence, the only alternative left to the President was to use the discretion granted in the sixty-two-year clause of the law of 1862.

June 1, 1863, he therefore placed on the retired list two colonels of engineers, two colonels of ordnance, one colonel of artillery, and one colonel of infantry. The dates of the original commissions of these officers ranged from 1806 to 1815.

August 1, 1863, two general officers, three colonels, and one lieutenant-colonel of artillery were retired in the same manner; the dates of their commissions ranged from 1812 to 1820.

September 15, the chief of ordnance was added to the list, while in November an assistant surgeon, with the rank of captain, was retired who had waited for promotion to the grade of major forty-five years.

In 1864 the paymaster-general and one colonel of infantry retired on their own application, while one chief of staff corps was retired by compulsion.

According to the Army Register for 1865 there was still on the active list, on the 1st of January of that year, an adjutant-general of forty-two years' service; the senior colonel of the quartermaster's department had served forty-six years; the senior major in the pay department, fifty years; the four colonels of engineers, from forty-six to fifty-three years,—the senior having entered the service in 1812, the junior in 1819. The two lieutenant-colonels highest on the list, in the same corps, who were rapidly approaching the age of sixty-two, when they might be retired, had been in service, one thirty-eight, the other thirty-nine years. In the artillery there was one colonel of forty-five years' service; in the cavalry, one colonel of forty-three years' service; in the infantry, two colonels of forty-three, and a third of forty-two years' service.

In the line, this partial enforcement of the law operated upon younger officers in the same manner as during the two preceding wars. At Gettysburg, the rank of the officers commanding regular regiments was as follows: Second Infantry, a major, and afterwards a captain; Third Infantry, a captain; Fourth Infantry, a captain; Sixth Infantry, a captain; Seventh Infantry, a captain; Tenth Infantry, a captain; Eleventh Infantry, a major; Twelfth Infantry, a captain; Fourteenth Infantry, a major; Seventeenth Infantry, a lieutenant-colonel.

Congress was not insensible to the injustice done the younger officers by the absenteeism of their superiors. In the law of July 28, 1866, it directed that regular officers entitled to be retired on account of wounds received in battle should be retired "upon the full rank of the command held by them, whether in the regular or volunteer service, at the time such wounds were received."

In short wars young officers are rarely ever heard from; but in great upheavals like the French revolution, or our late civil war, they will always come to the surface for reasons readily explained. If two men, one twenty-five and the other sixty, were to begin the study of an abstruse science together, which presumably would master it quickest? Whose mind would be the more receptive, acquisitive, active? During the suspension of military operations, whose physical and mental energies would the more surely vent themselves in preparing his command for the next battle?

An officer who has passed the climax of his physical powers, if in command of a brigade or division, may still issue excellent orders for the instruction of his troops. But take two officers, one twenty-five, the other sixty, and place them at the head of raw regiments, which will have the most drills and recitations? Which will visit his guards the more frequently at night? Which will be first in the assault? Which will have the most endurance? Which, through sympathy, cheerfulness, and earnestness of temperament, will urge his men to the greatest endurance and achievements?

If we glance at our own history, we shall find that the record of young officers is as brilliant as during the wars of Napoleon. Washington, when he took command of the Continental army, was forty-three; Greene, in command in the Carolinas, was thirty-eight; Knox was chief of artillery of the Continental army at twenty-five; Croghan, who was the first to defeat Proctor in 1813, was twenty-one; Scott, at Lundy's Lane, was twenty-eight; Jackson was the hero of New Orleans at forty-eight.

Long wars are always favorable to youth. This, in our own history, was proven during the Rebellion by such officers of the regular army as were fortunate enough to secure commissions in the volunteers.

The average service of the one hundred and forty-four who were commissioned general officers of volunteers at the date of receiving their commissions as such was sixteen years and eleven months. Their average age was less than thirty-nine. They thus became the natural leaders of the vast armies of volunteers, the average age of whose officers was little, if any, above thirty.

As the consequence of having no law of retirement prior to 1861 was to prevent the promotion of officers to the grade of lieutenant-colonel until after an average service of thirty-five years in the artillery, twenty-nine in the infantry, and twenty-three in the cavalry, it will naturally be inferred that the vast majority of the one hundred and forty-four general officers of volunteers selected from the army were found in the grades of major and below. This inference is supported by statistics.

The rank held by these officers in the army was as follows:

Brigadier-generals	1
Colonels	13
Lieutenant-colonels	9
Majors	48
Captains	68
First lieutenants	5
Total	144

If the average number of years' service before becoming a major in artillery was thirty, infantry twenty-four, and cavalry nineteen, giving the officers in these grades a minimum age of fifty-two, forty-six, and forty-one years respectively, it may be asked, with an average age of thirty-nine for the general officers of volunteers, why so many as forty-eight were found in the grade of major? The answer is, that the rule of promotion was upset on the 14th of May, 1861, when the army was trebled, by increasing it from thirteen thousand to thirty-nine thousand men. This was done two months before the President by law was given the authority to appoint general officers of volunteers. In the above table the grade of colonel is credited with thirteen appointments. Of this number, one held the rank of colonel on the 1st of January, 1861; one was a lieutenant-colonel; seven were majors; and four captains; one, having resigned, was, on his reappointment, of the age appropriate to the rank of captain.

A similar investigation will show that nearly all of the forty-eight majors, before the sudden increase of the army, were captains, while, in like manner, many of the sixty-eight captains were first lieutenants.

Of the twenty-one general officers of volunteers whose army service was twenty-five years and upward, but two held commands in the field in the closing campaign of 1865.

The immense force of cavalry called out in 1861 suffered more for want of active leaders than either of the other arms of service. With the senior officers in command, to make a horse sweat was a crime. Throughout the years 1861 and 1862 the cavalry did little except to perform picket duty and collect information. As late as 1863, Hooker, it is said, offered a reward for a "dead cavalryman."

Pleasonton, Buford, and Bayard, chafing for action, had not all this time been laboring in vain.

When the former was placed in command of the cavalry corps of the Army of the Potomac, in 1863, he insisted that he should name his own generals.

At Gettysburg, Gregg, Buford (who opened the battle, holding the enemy in check till the arrival of the First Corps), and Kilpatrick commanded divisions. Farnsworth, Custer, and Merritt commanded brigades. The gallant Farnsworth, who was killed in the battle, had learned his profession during two years of war. Merritt had been in the army three years. Kilpatrick and Custer but two.

The cavalry in the West was under equally young leaders. The force of twelve thousand, which on its way to Virginia, in 1865, swept through Alabama and Georgia, capturing Selma, Montgomery, Columbus, and Macon, carrying Selma and Columbus by assault, was commanded by Wilson at the age of twenty-seven. The average age of the corps, three division, and six brigade commanders, was twenty-eight. The corps and one division commander were captains in the army; the other two division commanders were first lieutenants.

But Senator Wilson's remark—"Your ablest officers are young captains and lieutenants"—finds more remarkable proofs when we consider the commanders of our armies.

The average age of twenty, viz., McDowell, McClellan, Buell, Hunter, Grant, Pope, Rosecrans, Foster, Burnside, Steele, Curtis, Meade, Gillmore, Sherman, McPherson, Thomas, Hooker, Howard, Schofield, and Sheridan was forty-one. The average age of Hancock, Howard, Sedgwick, Sickles, Slocum, Sykes, corps commanders at Gettysburg, as also McClernand, McPherson, and Sherman, corps commanders at Vicksburg, was under forty.

In the Confederate armies it was the younger officers who gave the greatest strength to their cause. The average age of Ewell, Hill, and Longstreet, corps commanders at Gettysburg, was forty-four. Stonewall Jackson, who in the first two years of its history imparted to the Army of Northern Virginia its spirit of dash and daring, died at thirty-nine. Stuart, the cavalry leader, won his fame and died at thirty-one.

These facts from our own history, as well as those cited from the wars of Napoleon, should be accepted as proof that our policy in time of peace as well as war should be to elevate as rapidly as possible officers under the age of forty-five to positions of responsibility.

Reason, no less than experience, points to the same conclusion. The decisions of our Supreme Court, composed of men mostly above sixty years of age, are models of judicial wisdom. The court in each case hears patiently the arguments of able counsel, and then after days, perhaps weeks, of careful research by one or more of its members, the decision is prepared, discussed, and, on the vote of a majority, promulgated as the decision of the whole body. In war the conditions are reversed. If the flank of an army is turned, or the centre pierced, there is no time for consultation. The general cannot defer his decision till to-morrow. He must act on the spur of the moment, and on his decision, often affected by his physical condition, may depend the fate of his government.

Judges, doctors, lawyers, and men of business may retain their mental powers in full vigor till after they pass threescore and ten; but the commander must have in addition the nerve and mental activity which belong only to vigorous manhood.

In 1861, it was a physical impossibility for the veteran general-in-

chief to take the field. The same was true of many of our field-officers, and is likewise true to-day.

A paper published by the Army Mutual Aid Association on the 30th of September, 1879, states: "The records of the adjutant-general's office show that since the Rebellion one hundred and seven officers have lost their lives in battle, or have died of wounds received in action, and that of this number but two were over forty years of age." During this time the records will also show that as a rule the absenteeism of the field-officers of high rank was limited to those above fifty. From this it can be inferred that as in the Florida, Mexican, and Civil wars, so now the officers who do the fighting are constantly serving in positions of responsibility without enjoying the rank or pay appropriate to their command, while if killed, their families are forced to content themselves with the pensions due to their actual rank.

No one supposes that in any country an army is maintained for the comfort or convenience of the officers or men who are in it. If laws—for example, such as relate to medals or brevets—are passed apparently in the interest of individuals, it will be found on closer examination that their real object is the interest of the state. Such, too, should be the object of any law of retirement. The individual should give place to the welfare of the government.

The objections to the present law already noticed are that it is unequally applied. As we have seen during the Rebellion, some chiefs of staff corps were brusquely set aside, while others remained undisturbed. The same system was applied to the line.

To-day it is in the power of department commanders to cause the retirement of all officers of the line over the age of sixty-two. In like manner, if not himself over age, the chief of any staff corps can cause the retirement of any of his subordinates who may have incurred his displeasure. If neither a department commander nor a chief of staff corps choose to take action, the dreaded retirement may at any moment be caused by the recommendation of the general-in-chief, or the Secretary of War.

The manifest tendency of this system is to destroy the independence, self-respect, if not usefulness, of many officers who are approaching or are over the age of sixty-two. Such as want to remain in service do not dare to stand on their record. They naturally seek influence within and outside of the army. If they turn the prescribed limit without being thrust out, they still live in uncertain dependence upon those who are above them. At sixty-three they find it no easier to retire than at sixty-two; sixty-five still finds them unwilling. To say that at seventy they would be mentally disqualified for their positions would be as injurious to personal pride as to fix the age at sixty-two.

The inference is plain. The opposition to retirement goes beyond any prescribed limit. They want no retirement at all.

While this is the feeling of those who are retained above the prescribed age, those who are promptly retired have just ground for complaint. They feel that their forty or more years' service has gone for nothing. They do not stop to reflect that they may have been put out through the pique or personal resentment of any particular superior. They feel that they have been inspected and condemned, blame the government for unequal dealing, and retire from its service regretting at the last moment that their lives have been misspent.

By contrast, let us look at the law of the navy. Section 1444, Revised Statutes, reads: "When any officer below the rank of vice-admiral is sixty-two years old, he shall, except in the case provided in the next section, be retired by the President from active service."

The next section prohibits the retirement of any officer of the grade of lieutenant-commander (assimilated rank of major in the army) or below, "except on account of physical or mental disability."

The wisdom of this law was proved during the Rebellion. Then—as it will do in the first foreign war—it placed in command of our men-of-war few officers over fifty years of age. In the battle of Mobile Bay in 1864, the age of the commanders of the eighteen vessels which ran by the forts varied from twenty-nine to fifty-five. The mean age was forty-four. Moreover,—a point not to be overlooked,—most of these commanders, as in the case of the "Monitor" and "Merrimac," the "Kearsarge" and "Alabama," were ably assisted by executive officers much under, rather than over, forty years old.

These were the considerations—national honor and success—which prompted the passage of the law of retirement in the navy. But when compared with the law in the army as applied to persons, its wisdom is equally apparent.

It will be observed that the law embraces all grades from commander to rear-admiral, or the assimilated grades in the army from lieutenant-colonel to major-general. As a consequence, every officer of the navy is guaranteed freedom and independence of opinion till the close of his life. He fears no invidious distinctions. He hears no insinuations of mental impairment. There is no room for malevolence to poison the minds of his superiors. There is no association between the retired list and degradation. On the contrary, when a rear-admiral of the navy reaches the age of sixty-two, he can say, I have enjoyed rank, pay, and command, I am grateful to my government, and now accept retirement as a just reward for long and faithful service.

Those who from interested motives oppose compulsory retirement, naturally prefer to let the law stand as it is; or failing in this, they ask to go back to the law of 1862, and by way of compromise enact that retirement shall only be made obligatory after forty-five years' service, or on reaching the age of sixty-five. It cannot be claimed that such a law will be in the interest of the state. It must therefore be based on

sympathy for persons; and this raises the question, Is not such sympathy misplaced? A little reflection will show that it is. There is scarcely an officer in the army over sixty-two years of age whose sons are not already commissioned officers, or else set up in business. Their daughters, too, as a rule, are married and settled,—some in the army, others in private life.

On the other hand, should the sixty-five-year limit be adopted, the rate of promotion, as before 1861, will doom the junior officers of the line to serve twenty, thirty, and even thirty-five years before attaining the grade of major. If they marry, as many officers do shortly after entering the service, they will have to meet all the expense of rearing, clothing, and educating their families, large or small, on the pay of first lieutenants and captains.

These hardships in the lower grades are by no means fanciful or uncommon. The four captains of artillery, highest on the list, have already served from twenty-one to twenty-three years. The senior captain of artillery attained his present rank in 1862, and subsequently was brevetted for gallant and meritorious services through all the grades from major to brigadier-general, inclusive. In 1865 he was made a brigadier-general of volunteers, and in November following was promoted to major-general by brevet "for gallant and meritorious services during the war." The senior first lieutenants of artillery have been in service from fifteen to eighteen years. In the infantry, the seventh captain on the list in January last had been in the service twenty-three years; the senior lieutenants have held their present commissions since 1865–66.

Assuming that the good of the state, as well as sympathy, should be on the side of the junior officers, let us look at the effect of retiring any officer who through age has become disqualified for field service. In the infantry, artillery, cavalry, and engineers the retirement of a colonel promotes five subordinates, viz., a lieutenant-colonel, a major, captain, first lieutenant, and second lieutenant,—all of whom save the lieutenant-colonel are presumably at the head of growing families. The retirement of a colonel in the adjutant-general's department, inspector-general's department, quartermaster-general's department, subsistence department, pay and ordnance departments, if the selection to fill the lowest vacancy is made from the grade next below in the line of the army, promotes the same number of officers as a similar retirement in the artillery and infantry. In a similar manner the retirement of a brigadier-general, or a chief of a staff corps, promotes six subordinates, while the retirement of a major-general can be made to promote seven. In the latter case the ultimate vacancy is that of a second lieutenant, to be filled by a meritorious non-commissioned officer, a candidate from civil life, or a cadet in the first class at the Military Academy. The promotion of seven officers, and the new appointment of an eighth,

costs the government, on the principle of all pension-lists, simply the retired pay of a major-general, whom age and hard labor have disqualified for service in the field.

The present law of retirement reads: "Sec. 1244. When any officer has served forty-five years as a commissioned officer, or is sixty-two years old, he may be retired from active service at the discretion of the President."

The text of the bill recently introduced into the House of Representatives by Mr. Butterworth is as follows:

"*Be it enacted by the Senate and House of Representatives of the United States in Congress assembled,* That section 1244 of the Revised Statutes of the United States be amended so as to read as follows:

"SEC. 1244. When any officer has served forty years as a commissioned officer, or is sixty-two years old, he shall be retired from the active service: *Provided, however,* That the provisions of this section shall not apply to the general and lieutenant-general of the army.

"Retirements under this section shall be in addition to those now authorized by law.

"That said original section 1244 be, and the same is, hereby repealed."

Unmindful of the age of our army commanders, from Washington down, the opponents of a system of compulsory retirement and speedy promotion rest their case on deductions from the late Franco-German war. In so doing they have laid hold of a weapon which cuts with both edges.

It should be remembered that under the Continental system all armies pass from the peace to the war footing by adding a second lieutenant to each company and filling up the ranks with men called back from the reserve. Wars under such a system are necessarily short. The Crimean war lasted but little over a year; the Franco-Austrian, Prusso-Austrian, Franco-German, and Russo-Turkish wars were all concluded in less than a year. In each case no opportunity was given for juniors to compete with their seniors. The time was too short for officers of the age of Davoust and Lannes to break through the crust of incapacity which bore down and swept away the defeated armies.

If, during the war which is now so frequently referred to, the German emperor had claimed that the result was attributable to the age of his generals, the fallen emperor in his turn might with bitterness have exclaimed that the command, instruction, and administration of his army had been benumbed by marshals and generals whose services reached back to the Crimean and Franco-Austrian wars, before modern armies had discovered the use and power of the breech-loader.

The success of Blücher's movement upon Wavre and Waterloo has uniformly been ascribed to Gneisenau, his young chief of staff. The success of the Germans in their last war is as universally ascribed to

the septuagenarian, Von Moltke, who may justly be regarded as the greatest phenomenon of military history. No Arbela, Cannæ, Pharsalia, Leuthen, or Austerlitz attests his genius as a personal commander on the field of battle. All of his victories were those of the cabinet. While the French generals were feeding on the vanity of past greatness, Von Moltke, the military adviser of the emperor, was perfecting the instruction and organization of the German army. Months before the campaign opened, a subordinate in the Bureau of Military Statistics computed that within three weeks after a declaration of war France could not muster on the Rhenish frontier more than two hundred and fifty thousand men. With this knowledge as a basis, the scholar rather than soldier worked out his plan of campaign, locked it in his secretary, and patiently waited. He knew, and so did the emperor, that within twenty-four hours after the click of the telegraph should be heard in the war-office at Berlin, more than four hundred and sixty thousand men would by rail begin the movement to the Rhine. Behind this immense force stood the Landwehr, an army of the second line, exceeding three hundred thousand.

Everything turned out as had been calculated. After the first easy victory on the frontier, all the chief of staff had to do was to give to the German armies the strategical directions which brought them on to the battle-fields of Metz and Sedan. Superior numbers, treason, and French demoralization did the rest.

Napoleon never omitted careful preparations, but his grandest triumphs in strategy and tactics were reserved for the excitement and tumult of battle.

Von Moltke has taught the world that an enemy unprepared can be vanquished before a declaration of war. His genius was the genius for work. Unlike Cæsar, Hannibal, or Napoleon, he will go down to history as the only famous general who never held a military command.

After considering the facts from ancient and modern history, as well as those within our own experience, should Congress still be tempted to base its legislation upon false deductions from the German system, it may find additional cause for reflection in the history of the Ute war, now in progress. How many officers, with the irresolution of advancing years, would, like Dodge, have galloped into the darkness, intent upon saving Thornburgh's command? When the news came that Thornburgh was killed; that Payne, Cherry, and their gallant comrades were fighting for life; when the country in suspense awaited tidings of another massacre like the one on the Little Big Horn, how many colonels of cavalry, sixty-five years of age, would, like Merritt, have attempted or dreamed it possible to march one hundred and sixty-five miles in two days?

EMORY UPTON,
Brevet Major-General U.S.A.

HEAVY GUNS, AND THE DEVELOPMENT OF THEIR POWER.

THE remarkable results obtained by Herr Krupp at his range near Meppen, which, exciting profound interest, stimulated rival gun-makers to quick action, may be said to mark an era in the history of ordnance,—a point of departure from which there will be an immediate advance.

Thirty-seven years have passed since Baron Wahrendorff (in 1843) applied his system of breech-loading to cannon, using spherical projectiles covered with lead and somewhat greater in diameter than the bore of the piece. As described by Adts, in "Canons Rayés," "The breech-loading system of Wahrendorff consists of a cylindrical stopple (*obturateur*), which is introduced by the breech into the bore of the gun to close it, and of another cylinder traversing the gun perpendicularly to its axis and to that of the cylinder (*obturateur*), to retain the latter in the bore against the effort exerted by the gas of the charge; such is the system in its simple form."

The characteristic feature of this system is the cylindrical bearing-surface of the piece traversing the axis of the gun perpendicularly to the axis of the bore.

In 1851, Wahrendorff adopted a cylindro-conic projectile of cast iron, its cylindrical and half its conical part covered with lead; this covering being retained in place by grooves in the surface of the projectile; subsequently this coating was replaced by four rings of lead. At first six grooves, with a depth of seven millimetres, making one turn in six metres. Subsequently the number of grooves was increased to twenty, in order to take better hold of the projectile.

The "gas-check" was a steel ring, ingeniously attached to the face of the breech-stopple (*obturateur*).

It differed essentially from the system of Cavalli (of 1845), in which, "crossing the bore at right angles, with its front face perpendicular to the axis of the piece, a *wedge-shaped* opening with a rectangular cross-section is cut. . . . This opening receives the quoin or wedge destined to close the breech in rear of the charge. The wedge is made of hardened iron or steel, and of the same shape as the part of the opening which it is to fit. The wedge-shape enables the bottom of the bore

to be more perfectly closed, and prevents the escape of gas, whilst it also enables the breech-piece to be more easily moved after firing. The front face of the *breech-piece* is perpendicular to the axis of the gun, whilst the rear face makes with it an angle whose tangent is 1.8 the coefficient of friction of the hardened iron wedge against the cast iron of the gun. By means of this disposition, and keeping the surface in contact well greased or moistened according as required, the breech-piece is found after firing to be more or less moved, at the same time that there is no danger of its being pushed too far or thrown out of its place. The rifling consists of two grooves with rounded edges, the projectile of iron, with two flanges or wings properly inclined to suit the grooving, and extending from the rear to a short distance in front of the cylindrical part, for the purpose of preventing as much as possible the oscillations of the projectile resulting from the windage, which is not destroyed in this piece." (Gibbon's "Artillerist's Manual.") The gas-check was a copper ring, similar to that employed by Armstrong, but not effectively applied.

Such success as was attained in these breech-loaders sufficed to show that the object could be accomplished and to direct further effort to that end.

In England were brought forward the Armstrong and the Whitworth systems of breech-loading. The former consisting of a "vent-piece" moving vertically in a slot in the breech, and supported by a tubular screw, through which, on raising the vent-piece, the charge could be passed into the bore: a ring of copper serving as a gas-check.

In the latter, or Whitworth system, the breech was closed by a cap, with an internal screw fitted to an external one on the rear of the gun, turned on or off by a handle.

It was said of this system, "There is nothing to weaken that which ought to be the strongest part of the gun, the breech. There is no reduction of its solidity, no slot, no vent-piece, and no movable appendage liable to be injured or lost." A disk of copper in front of the breech-cap served as a gas-check.

The failure of the Armstrong system led to its abandonment by the government, and gave rise to a prejudice in England against breech-loaders.

In the Whitworth system, the connection, by screw-thread, of the breech-cap and gun, being on the exterior of the gun, is at a considerable distance from that part of the cap upon which pressure is directly exerted by the gases; and although this unfavorable relation may not, in guns of small diameter, be rendered evident, by distortion of the cap, it would probably be developed in the case of larger guns, unless the screw-cap were of such massive dimensions as to render it unwieldy.

The Whitworth system is undoubtedly better than that of Armstrong, which failed in service with guns of comparatively small calibre.

But it is to be noticed that the Whitworth is subjected by its charge to very great pressures.

In what is known as the Eastman, or, from its adoption in France, the French slotted-screw-breech-plug, is found the most effective of the modes of closure depending upon screw-thread. But until subjected to such tests as have been withstood by the Krupp system, its comparative efficiency will not be determined.

In the Krupp system are combined, in improved form, the essential and characteristic features of those of Wahrendorff and Cavalli,—the cylindrical bearing of the former; the wedge form and flat face of the latter,—united in the cylindro-prismatic wedge-formed block (the cylindrical side slightly tapered) which serves as a breech-plug, and which, with the Broadwell ring, gas-check, and the unrivaled steel cast and forged at Essen, has resulted in the attainment of unequaled strength in breech-loading guns.

As employed by Wahrendorff, the diameter of the transverse cylinder was necessarily limited in order that it might pass through and lock the longitudinal cylinder, which, closing the bore, presented its forward face to the charge, received the pressure of the gases and transmitted it to the cylindrical bearing on the cast iron of the gun. The union of the transverse cylinder with the flat face and taper of the Cavalli wedge rendered it possible to increase its diameter, and thus obtain a proportionally increased area of bearing surface; a corresponding increase of the diameter of the breech of the gun compensating for the enlargement of the aperture in which the block slides.

As the "lines of action" are normal to the surface of this bearing, the distribution of stress is such as to obviate that tendency to shear which exists when transverse pieces of rectangular section are employed and the lines of action are consequently parallel to the axis of the bore.

That the magnitude of the resultant force of expansion of the powder gases parallel to the axis of the bore is equal to that of the direct action in the case of rectangular section, and that the longitudinal tensions are also equal, is true. But the shearing stress due to direct action tends to start a crack in the breech of the gun along the rear edges of the transverse piece.

Considering the different distribution of the stresses in the two systems, it may be inferred that with the cylindro-prismatic transverse piece, fracture would occur at its forward face; there would be no local pressure transmitted by the transverse piece, tending to start a crack, but simply longitudinal tension; and the crack would start at that point, rather than at the line of junction of the cylindrical with the plane surface of the block, in consequence of the lateral pressure of the powder gases at the face of the block, on the walls of the bore. That with the block of rectangular section fracture would occur at the rear face.

The high velocities attained with guns of extraordinary calibre, and the extreme accuracy of the practice at Meppen, were matters of surprise and acknowledged admiration. Of the nature of the effect produced in England abundant evidence is presented in newspapers of that country.

That with symmetrically formed projectiles closely fitting the bore, and unencumbered by a bristling array of studs, great accuracy would be attained was apparent; but the extraordinary velocities and corresponding penetrating power developed were unexpected, and it is in regard to these points that most interest is expressed.

As improvements have been made in the forms and modes of construction of guns, various means have been employed to obtain strength of material to withstand the constantly increasing stresses to which the demand for power subjected them.

Sir J. Emerson Tennent, Whitworth's able champion, says, in the "Story of the Guns" (1864), "The *beau idéal* of a perfect gun is one which will give the gunner the positive mastery over gunpowder; in other words, a gun which cannot be burst."

But the mastery of gunpowder is not to be obtained by strength of material or mechanical skill; and recognizing this fact, efforts have been constantly directed to the discovery of some other mode of reducing that powerful agent to subjection. Experiment and careful consideration lead to the conclusion that the proportions of gunpowder, which are practically the same in all war powders, could not be changed without diminishing its total explosive force. It was for Herr Krupp to demonstrate at Meppen to the world, what had been already established, that there is a mode of using gunpowder which makes the artillerist its master. And as it is to this recently diffused knowledge of the true mode of controlling the action of gunpowder that public attention is directed, it may be of service to trace the steps by which with slow advance it was attained.

In a preceding number of THE UNITED SERVICE the writer had occasion to refer to the recommendation of Captain Alfred Mordecai, of the United States army: that in accordance with the results of experiments made at Metz, and of others subsequently made at Washington Arsenal by himself, the diameters of cartridges for heavy guns should be reduced.

In his own words: "For the purpose of diminishing the strain on the gun, I propose that the principle of increasing the length of the cartridge by reducing its diameter should be adopted for heavy guns. The diameters of the cartridge-formers may be established as follows:

Calibre	42	32	24	18
Diameter of cartridge-former . . inch	6	5.5	5	4.6"

The report containing this recommendation was dated February 11, 1845.

The French experiments referred to were suggested by Piobert in consequence of having observed in the course of a series of experiments at Esquerdes, in 1831, with powders made by old and new processes, that the initial tension was much reduced by a space in the rear of the ball, and from having considered also the remarkable and to that time unexplained destructive effects produced by *ramming* the cartridges of siege-guns.

Referring to the violent action of the improved powders used in the experiments at Esquerdes, which when employed in large charges injured and soon destroyed the guns, and when reduced sufficiently to obviate this effect gave inferior velocities, he said, "It would be sad to think that art having placed in our hands a considerably increased motive-power we knew not how to use it. Happily it is not so, and in this, as in many other cases that occur in which we cannot modify the agent nature has furnished, art consists in employing that agent in such a manner as to profit by its useful properties in neutralizing those which are injurious. In this instance the end may be attained by reproducing constantly in firing the conditions accidentally presented in the experiments at Esquerdes, and which sensibly modified the greatest efforts exerted by the powder.

"It was found, in fact, that the powder of Ripault, in consequence of its greater rapidity of combustion, had given sensibly the same initial velocity as the powder of Metz, notwithstanding the greater length of its charges, which notably diminished the density of the gas during the first instants of the projectile's motion; so that the greatest tension of the elastic fluids was lower than that which occurred with the powder of Metz.

"It is apparent, then, that in augmenting the space in rear of the ball the maximum tension of the gases, as well as those which occur in the commencement of their expansion, diminish much more rapidly than the initial velocity, and in such a way that a powder quicker than another may, when suitably arranged, give greater initial velocities without exceeding or even equaling the tension of the gases of the slower powder placed in a smaller space. If there be adopted for powders of the new process of manufacture—which are much more energetic than that of Ripault—a mode of using analogous to that employed in these experiments, which rendered it less destructive than the powder of Metz, the advantage will be much more marked than that already observed, and we may thus lower considerably the maximum tensions which have rendered these powders destructive without diminishing in the same ratio the superiority of initial velocity to that of the ancient powders.

"We can conceive this result without recourse to all the developments

which comprise, in general, questions as to the effects of powder; if we consider that the combustion of the grains being far from instantaneous, the projectile traverses a certain length of the bore before all the gas is formed, the density of the elastic fluids, which increases rapidly, soon reaches its maximum, usually before the ball has been moved half a calibre, after which it rapidly diminishes. Thus in the first instants the density of the gas depends above all on the first placing of the ball, the slightest variation in which affects the small space then occupied by the gas. Its maximum varies sensibly with this first position of the ball, and as the tension of the gas increases in much greater ratio than its density, the greatest effort of the elastic fluids may be doubled in placing the ball half a calibre nearer the bottom of the bore.

"But as the density of the gas diminishes, the influence of the first placing rapidly decreases, and becomes nearly insensible when the projectile has traveled a distance of several calibres along the bore; so that the effects of the motive force become very nearly the same in all cases, before the epoch 'of entire combustion of the powder;' and if we hasten this epoch by the employment of a quicker powder, we can compensate, and more than compensate, the losses which result from lengthening the charge, since the diminutions of tension although very great in the first instants, taking place only during a very short course, their sum is less than that of subsequent augmentations, smaller it is true, but which take place during a much longer course."

The means here indicated of controlling the destructive action of violent powders were proposed to the Minister of War in October, 1833, and were first tried at Metz in the following year with very favorable results. In 1836 and 1837, experiments of comparison at Metz of war powders manufactured by different processes afforded a very good opportunity to test still further the new mode of charging, with the largest charges, used in service, of powders most injurious in their action upon guns. The results in this instance were also very favorable.

In 1838 the Minister of War ordered experiments to be made at "l'École de Douai," to compare the mode of charging guns of large calibre, which up to that time had appeared to be most effective in diminishing the destructive action of heavy charges of powder, and to test decisively these means of preserving the bores of guns. The experiments were made, and afforded such conclusive evidence of the superiority to all other modes of the "Système de chargement allongé," as it is called, that it was adopted for all siege-guns (August 9, 1839). Experiments were also made in Russia and in Austria, with most satisfactory results.

The reduction of the diameter of the cartridge of the 42-pounder in the United States to 6 inches, made the ratio of the volume of the cartridge to that of the space occupied by it in the bore of the gun 0.73.

In Piobert's own words, "Experiments in different countries all prove that, while sparing the bores of guns, the elongated charges give, to a certain extent, higher initial velocities to the projectile than do the old modes of charging, when exceeding one-fourth the weight of the ball; and that when smaller, the velocities are sensibly the same in the two systems. This mode of charging augments the useful effect of the powder, when that is required, while it diminishes the destructive effect of this energetic agent."

It appears that in England little importance was attached to the "space." The French experiments to determine the influence of the diameter of the cartridge on initial velocity are mentioned by Sir Howard Douglas, but no reference is made to the influence on tension. ("Naval Gunnery," p. 112, ed. 1860.)

In 1842–43 a series of experiments to determine the influence of the diameter of the cartridge on *initial velocity* were made at Gâvre, followed by a second and third series in 1844. The conclusions arrived at, as stated by Hélie ("Traité de Balistique"), were that for a "canon de 30 No. 1," of the calibre 1.648, the diameter of the "former" of the cartridge which corresponds to the greatest velocity is very nearly equal to 151 millimetres, whatever charge may be employed; whether of the "*poudre du Ripault*, or that of *Pont du Buis;* whether the shot are solid or hollow; with or without sabots." And it was inferred that the ratio of the diameter of the cartridge to that of the bore should be 0.916.

In 1846, M. Delvigne proposed a new mode of charging: Leaving a space between the cartridge and the bottom of the bore, the projectile being in immediate contact with the cartridge, which is ignited at its forward end. The first experiments were made the same year, others at Gâvre in 1859, with the aid of the ballistic pendulum, with varied position and size of space; the space being maintained by means of two short, thin boards joined at right angles. The gun, "canon de 30 No. 1;" calibre, 1.648 decimetre (6.49 inches); solid shot of 1.596 decimetre (6.28 inches) diameter; weight 15.05 kilogrammes (33.2 pounds); *poudre du Ripault*, 1856; diameter of "former" of cartridges, 1.5 decimetre (5.91 inches); charge, 5.0 kilogrammes (11.02 pounds).

The tabulated results are as follows:

M. Delvigne's Mode of Charging.

	Length of space. Decimetres.	Initial velocity. Metres.
Space in rear of cartridge . .		487.1 (15,982 ft.)
Ignited at forward end . . .	0.4 (1.57 in.)	510.8 (1676 ft.)
Weight of charge, 5 kil. (11.02 lbs.)	0.8 (3.15 in.)	508.4 (1668 ft.)

"The evident superiority of the proposed mode of charging is readily explained. The first gas developed repelling to the rear the entire mass of the charge; the grains, separated from each other, are

more accessible to the flame, and combustion is more complete, but too large a space causes great diminution of the tension."

"To facilitate the application of his mode of loading, M. Delvigne proposed to terminate the bore of the gun by a chamber of a diameter a little less than that of the cartridge, this chamber to remain empty."

We come now to the consideration, in this connection, of a point of peculiar importance,—the *shock* of the products of combustion of powder against bodies not in immediate contact with the powder.

"The results of experiments on the resistance to rupture of shells of different dimensions, from 118.4 to 320.3 millimetres exterior diameter, in which the height of the void space above the charge ranged from 35 to 135 millimetres, with capacities for from 190 to 2180 grammes, and which burst with charges of from 140 to 360 grammes, indicated that with the lightest of the shells of the calibre of 162.9 millimetres, the gas having traversed a distance of 80 millimetres before reaching the walls of the shell, a greater effect was observed than that which was due to the pressure only. It seemed as if the gases could acquire in the interior of the projectile such a velocity of expansion that, notwithstanding their small mass they had acquired at the instant of striking the walls, notable energy, producing an appreciable effect; in this case the effect was very slight, but it increased rapidly as the distance of the walls became greater. . . . The results obtained in these experiments on the rupture of large projectiles showed that the effects of the shock of the gas are greater as the interior capacity of the projectile bears a greater ratio to the charge; as the upper walls are farther from the powder, the elastic fluids can acquire a greater velocity of expansion."

These effects of shock were indicated by the difference between the weight of powder required by calculation to burst the shell and that which was actually required; so that if the computed tension was greater than the actual tension of the gases,—which is probable, for the force of gunpowder assumed by Piobert is now considered to be excessive,—the difference would be more apparent in the larger than in the smaller shells, and may have been due to such over-estimate. It cannot therefore be said that the results of these experiments establish the theory of "the shock."

Piobert arrived, however, at the conclusion that "the shock of the gas of gunpowder against obstacles which it meets are sensible when the distance traversed by the gases in their free expansion is more than 80 millimetres."

Hélie, referring to the premature bursting of a gun, which occurred at the two hundred and eighty-eighth round, in testing Delvigne's mode of charging, which he attributes to a faulty arrangement in placing a second vent, says, "Perhaps, in order to avoid altering the position of the vent, it might be proposed to have the empty space not in the rear of the cartridge, but between the latter and the ball. In

that case, the gas moving with a certain velocity at the instant of reaching the projectile would encounter a resistance which would give rise to reactions, of which the results have always been considered dangerous."

The same author, in treating of the "influence of the mode of charging on rupture," says, "The destruction of guns (cast iron) is very rapid when the cartridge having the regulation diameter, nearly equal to $\frac{916}{1000}$ of the calibre, is pushed to the bottom of the bore, and is in close contact with the projectile. Usually 400 rounds with charge of 5 kilogrammes and a solid shot suffice to effect rupture of a 'canon de 30 No. 1.' But such is not the case when a soft wad of oakum (*etoupe*) is interposed between the cartridge and the projectile. In experiments made at Gâvre in 1847, on 'canons de 30 No. 1,' the wad was 16 centimetres in diameter, 11 centimetres in length, and weighed about 400 grammes.

"The guns sustained more than 2000 rounds with solid shot and a charge of 5 kilogrammes, without any rupture being produced. The vents had acquired enormous dimensions, the cylindrical form had disappeared, and the section of least area was about 20 millimetres from the exterior surface. . . . It results from these facts that the soft oakum wad placed between the cartridge and the projectile assures the safety of the gun.

"Yielding to the pressure, a space is supplied into which the gas expands, preventing its acquiring the dangerous tensions which cause rupture, and yet the mean pressure is found to be augmented; the initial velocity becomes, in fact, a little greater."

While the better influences of space are seldom, if ever, referred to in American or English works on gunnery, warning of the dangerous *shock* is sometimes given.

As expressing the generally-accepted theory, the following extract from Ward's "Naval Ordnance and Gunnery," a naval text-book in 1846, and an authority in its day, may be given: "But if a charge not rammed home does ignite, a still worse consequence may follow, namely, explosion of the gun. A vacant space exists, which the fluid must occupy before it can act to propel the ball; hence the fluid *begins to act* upon the ball with an accumulated force, and the result is similar to that which follows the use of fulminating powder."

"It is possible," says the same author, "that a soft wad, or one not *very* hard, placed in rear of a large shot, by being subject to compression under the action of the charge and resistance of the shot before the latter has taken up any motion, is to the extent of that compression equivalent to a vacant space, and so far dangerous to the gun."

From an army text-book, also an authority, published in 1860, a similar extract may be taken:

"The development of its force (gunpowder) is affected by the pro-

portion of the space which it occupies to the space around it in the gun. It is found that as this vacant space increases the projectile force of the powder greatly decreases, whilst its absolute force or shock seems to increase. Thus, for instance, when a ball is not rammed *home*, it is not moved by the first portion of the gas evolved, but it remains stationary until nearly the whole of the charge is developed, when, acting by its inertia against the immense shock of this force, the violent reaction of the fluid takes effect before the ball moves and bursts the gun. In the same way, a musket whose muzzle has been stopped with mud, or even snow, has been known to burst just behind the obstruction. As a gun is usually loaded, the ball moving with the first gas generated, its inertia is gradually overcome, it furnishes space by degrees as the development of the gas requires it; no shock is felt, and nearly the whole force of the powder is transferred to the ball instead of the gun."

As an illustration of the consequences of this prevailing theory in leading to erroneous deductions, may be mentioned the following incident:

"In 1860 an 80-pounder Whitworth gun, on board the 'Excellent,' was found to have a crack in the inner tube, between the breech and the muzzle. Mr. Anderson, the assistant of Sir William Armstrong in the Royal Factory at Woolwich, 'was sent to examine into the cause' of this mishap, and along with him were associated two eminent engineers, Mr. Penn and Mr. Field. Their joint report, far from imputing the catastrophe to any defect in the gun, ascribed it exclusively to an oversight in permitting an 'air-space' to remain between the projectile and the charge." ("The Story of the Guns," page 209.)

In "European Armaments in 1867," by Captain C. B. Brackenbury, R.A., assistant director of artillery studies, the author, referring to an attempt by Mr. Mackay to obtain rotation by rifling the gun, and putting a bag of sawdust between the powder and a smooth projectile, says, "Any space between powder and shot, even if filled by a wad, has been proved to be fatal to the endurance of smooth-bored guns; but this appears not to be the case to so great an extent with rifled ordnance. Possibly Mr. Mackay may succeed yet, but if so, he must give more windage."

The explosion of the 38-ton gun on board H. M. S. "Thunderer" was also at first attributed to a supposed space between the shell and the powder; but this opinion as to the effect of an air-space could not be maintained in the light of experience, and the proposed solution was rejected.

In April, 1872, the "Committee on Explosive Substances" reported the results of experiments with the 25-ton gun with calibre of 11 inches; with 35-ton gun with calibre of 11.6 inches, and increased to 12 inches. The object of experiment with the 11-inch gun was to determine the battering-charge of P. powder.

The report, given in Simpson's "Naval Mission to Europe," is as follows:

"The committee were instructed that the pressure caused by the charge of P. powder should not exceed that given by 70 pounds of R. L. G. powder. The committee found that this result was given by a charge of 85 pounds. It is necessary here to state that the proper course to be followed, in the opinion of the committee, in determining the battering-charge for any gun is as follows: To increase the charge gradually until distinct wave-pressures are exhibited, the highest charge which can be employed without these local pressures appearing should then be accepted as the battering-charge. . . . The charge of 85 pounds of P. powder exceeds that which the above-mentioned rule would give for this gun, but to no dangerous extent, although the maximum useful effect of the charge is not obtained. This fact is pointed out by the committee in their report, where they state that 85 pounds of P. powder is more advantageously consumed in the 12-inch than in the 11-inch calibre.

"In determining the battering-charge a comparison between the powers of the gun with a calibre of 11 and 12 inches came incidentally under the notice of the committee; the results of the experiments clearly demonstrated that a gun of 145 inches length of bore is more powerful as a battering weapon with a 12-inch calibre than with one of 11-inch, and this is still more evident when it is considered that with a 12-inch calibre the gun would probably consume 95 pounds of powder with as good useful effect per pound of powder, and with no greater pressure per square inch than it does 85 pounds of powder with an 11-inch calibre."

The 35-ton gun, as originally constructed in 1871, had a calibre of 11.6 inches, and length of bore, 162.5 inches. It was vented at 12 inches from the bottom of the bore, weight of projectile, 700 pounds. It had been proved with eight rounds, using the service-weight of projectile (700 pounds) and charges varying from 75 to 130 pounds; the pressure per square inch at the base of the projectile ranging from 17 to 64 tons. The results being considered anomalous, the gun was handed over to the committee and fired. First, twelve rounds, the charges varying from 75 to 120 pounds of powder, the same weight of projectile (700 pounds) being used throughout. During these rounds three different points of ignition were tried, viz., rear, service, and front. Pressures were obtained by means of crusher-gauge in the vent as well as in the base of the projectile. The results corroborated the opinion of the committee, that with charges higher than 110 pounds intense local pressures were occasionally set up in the powder-chamber. It was also demonstrated that the service position of the vent, viz., near the centre of the charge, is a more advantageous point of ignition than either front or rear. Further experiments were made. Fifteen

rounds, with charges of 110 and 115 pounds of P. powder, with similar results.

In consequence of the observed influence of diameter of the bore upon wave-pressure, the gun was bored up to 12 inches. The first experiments consisted of a series of seventeen rounds with charges of 110, 115, and 120 pounds of service P. powder. The experiments with the 12-inch calibre were carried out under precisely the same conditions as were those with the calibre of 11.6 inches. "Several very important points were elucidated by these experiments; among others the advantage gained by even the small increase of calibre by four-tenths of an inch, whereby the strain on the powder-chamber was considerably reduced and the power of the gun proportionally increased. It appeared also that 115 pounds of P. service powder was the maximum that the gun could consume with advantage. . . . As the advantage with respect to velocity was considerable, with a charge of 120 pounds, compared with that obtained with 110 or 115 pounds, and as no very intense pressures had as yet been set up by the former charge (120 pounds), it was deemed advisable to continue the trial with 115 and 120 pounds of several different brands of service P. powder." Eight rounds were first fired.

"The results obtained from these, combined with those from former rounds, showed that the velocity of the projectile with a charge of 120 pounds was increased by about forty feet, as compared with that obtained by the charge of 115 pounds. Although wave-pressure was exhibited to a marked degree, yet it never rose beyond 42 tons to the square inch with a charge of 120 pounds."

It was, however, deemed desirable to continue the trial to the extent of eight more rounds with a charge of 120 pounds, and four with that of 115 pounds. The results "demonstrated that a charge of 120 pounds was wholly inadmissible, as with this charge the wave-pressure occasionally amounted to 60 tons; also, that 115 pounds could not be prudently used, as with this charge the pressure sometimes exceeded 40 tons."

"On the completion of these experiments the gun was carefully examined, and the tube was found to be slightly cracked, the crack commencing in the front part of the powder-chamber, at the base of the projectile, in the lower part of the bore, and extending some fourteen inches towards the muzzle."

The committee then pointed out that the three following courses were open: "1. To increase the calibre of the gun to 12.5 inches, which would, in their opinion, enable it to consume a charge of 120 pounds without excessive pressure. 2. To prepare a special powder, whereby the power of the gun with a calibre of 12 inches could be developed, without any undue pressure. 3. To reduce the charge."

The diameters of the cartridges employed in these experiments are

not given; but as the charge of the "Thunderer's" 38-ton guns, in 1879, were 85 and 110 pounds pebble powder, and the "tracing of gun, in section, as loaded with a full charge of pebble powder and common shell; and also, in section, as double loaded with a battering and a full charge" (see Appendix to report of "Thunderer" Committee) represents the cartridges as *filling the space* between the projectile and the bottom of the bore; and as the gravimetric density, computed from the given lengths and weights of the cartridges, 1.0, is also that assumed by Major Noble in estimating the pressure at the bottom of the bore at 25½ tons for the 85 (as well as for the 110 pounds charge), it is to be presumed that the experimental charges filled the space in rear of the projectile, and were therefore of nearly the same gravimetric density, 1.0.

This inference is confirmed by a statement in the report of a special correspondent of the *Times*, who, writing from Spezia (November 18, 1876), refers to the results of experiments at Woolwich as follows:

"It was found that a charge of powder ignited at one point runs up its pressure rapidly to a little below the maximum, then more slowly to the maximum, at which moment the shot has moved so far that the pressure of the gas, which is still increasing, is balanced by the increase of room left for the gas to expand in, because the shot has begun to move away from the burning powder. From that moment all danger to the life of the gun is over. But if the greatest pressure is relieved by more air-space, why not have a certain amount of air-space at the beginning, so that the *maximum* pressure will never be high, since the shot will move before the space left can be filled with gas at so high a tension? Another help will be that the charge, if relieved of the early high pressure, will not burn so quickly.

"Acting on these ideas, Captain Noble induced the committee to try having an air-space above the charge, and subsequently, arguing from the results attained, to increase the intended charge for the 80-ton gun. Success attended both measures. The experimental gun was relieved from its highest pressure, and the 80-ton gun has fired charges quite uncontemplated at first."

This appears to have been the first application of the "air-space" in England, and to have been regarded in the light of a discovery.

The more remarkable, in view of the fact, that by experiments made with a 13-inch rifle at Charleston in 1863, and by experiments subsequently made at Augusta Arsenal,—referred to by the writer in the July (1879) number of THE UNITED SERVICE,—it was shown, as stated in the report of the board of artillery officers, of which Colonel Geo. W. Rains was president, "that, in the series of experiments undertaken to elucidate this subject, with the different guns at the disposal of the board, the fact was clearly established that the common opinion as to the danger incurred in the displacement of the projectile from the charge

is without sufficient foundation. That the maximum strain on the gun is experienced when the projectile is closely rammed home on the charge, the latter being packed and fitting the bore. That in proportion as the projectile is removed from the charge towards the muzzle the strain decreases, and is at its lowest point when it is at or near the muzzle itself."

So that, in addition to what had been so well established in regard to the efficiency of a comparatively small space in diminishing initial tension, the common opinion that a *considerable* space involved shock and was fatal to the gun had been shown to be an error.

The variable and sometimes intense local pressures observed in the English experiments were evidently due to unsymmetrical and irregular ignition of masses of powder in cartridges filling the space in rear of the projectile, and in which there were centres of explosion, resulting in the generation of contending volumes of gas in a space limited to the volume of the cartridge. And these intense local pressures became more apparent as the mass and length of cartridge were increased.

But this incidental occurrence in determining the battering-charge of an 11-inch gun, which should not exert a higher tension than that given by 70 pounds of R. L. G. powder, led to important consequences. The observed favorable influence upon the combustion of a given charge of powder, necessarily associated with an increase of bore, in consequence of the reduction of ratio of length to diameter in cartridges, which filled the space in rear of the projectile, and in which ignition could only be effected by the passage of flame between the closely-packed grains, led the committee at the close of each series of experiments to recommend an enlargement of bore, which, although presenting the anomaly of the larger charge for the weaker gun, did not, at that time, result in a satisfactory solution of the proposed question,—the proper battering-charge for the 11-inch,—but in a rapid increase of calibre of the English guns.

The "wave-pressure" of these experiments should not be confounded with that pressure which may result in the case of a long air-space between the powder and the projectile during recompression of the first volumes of gas, which, expanding as they move forward in the bore, mingle with the air and form a cushion transmitting pressure from the working gas, which receives heat as it is generated from the burning powder. Nor can such spaces be regarded as paths along which the gaseous products of explosion are projected, to be suddenly arrested by the inertia of the projectile and to act as by collision or impact upon its base, and then, reacting, to transmit excessive pressure to the walls of the bore immediately in rear of the projectile.

In 1876 attention was drawn to the results of experiments made at Spezia with a 100-ton Armstrong gun, in which the employment of the air-space produced its legitimate results. With a charge of 341.6

pounds of powder, and a projectile of 2000 pounds, an initial velocity of 1500 feet was obtained with an observed pressure at the bottom of the bore of 19.9 tons per square inch. (*London Times*, November 25, 1876.)

A charge of 352 pounds of English powder, which nearly filled the chamber, leaving little air-space, gave a velocity to the 2000 pounds projectile of 1512 feet, maximum pressure 21.4 tons per square inch. A charge of 363 pounds, in the form of a cartridge of reduced diameter, 56 inches long, projecting four inches beyond the chamber, gave a velocity of 1514 feet, pressure on the bottom of the bore 20.6 tons per square inch, and on the base of the shot 19.8 tons per square inch. A charge of 374 pounds of the same length (56 inches), a velocity of 1543 feet, pressure on the bottom of the bore 21.4 tons, and on the base of the projectile 18.1 tons per square inch. (*London Times*, November 15, 1876.) Major Noble stated (in evidence before the "Thunderer" Committee) that two rounds were fired with air-spaces, one by accident, the other at his instigation. "The charges were in both cases 441 pounds W. A. pr. powder, which exhibited, at least in their large charges, a considerable tendency to develop wave-action. The weight of the shot was 2500 pounds. In the one case, the accidental one, the cartridge was in its place, the projectile about two and a half feet from its seat. The pressure on the shot was not measured; that on the bottom of the bore was the same as usual; in the other case the cartridge and shot were together, both being a little over two feet from their seat. In this case the mean pressure indicated at the bottom of the bore was 28.4 tons per square inch, but was of so local a character that two crusher gauges separated by only one inch gave results differing by six tons. The gun was in no way affected by either round."

It appears, from what precedes, that the recent striking results are not so much due to recent discoveries as to the application of well-established and long-known principles,—the air-space, large-grained powder, and, as far as possible, simultaneous ignition, and increasing rate of combustion by means of a form of grain first devised and tested by Rodman,—"perforated cake powder." Of this powder a full description is given, with a statement of the principles and theoretical considerations by which it was arrived at, in a report dated April 17, 1861, and published in the same year by authority of the Secretary of War.

Comparing it with what is commonly known as large-grained powder, Rodman says, "The large-grained powder greatly diminishes the strain on the gun in producing a given velocity from that due to ordinary cannon powder, and the larger the grain the less will the maximum exceed the mean pressure, and the greater will be the charge required to produce a given velocity. The large-grained powder, owing to its being less costly than the perforated cake, and giving ordinary

velocities without excessive strain upon the gun, will probably be most generally used; but for guns of very large calibre, or when extraordinary velocities are required, the perforated cake should be exclusively used; and as for our common cannon powder, it is too fine grained and too explosive for field-guns, and certainly never should be used for guns of large calibre. And all powder, of whatever kind, should be sufficiently hard pressed to render it impermeable to gas under the pressure to which it may be subjected in firing."

In this application is found the nearest approach to "a condition of uniformity of pressure along the entire length of the bore" that can be obtained by adjustment of rate of combustion of the powder.

But there is still to be considered that first or initial tension which occurs before the projectile has sensibly moved from its seat. It is essential that in all large charges ignition should be as nearly as possible simultaneous, otherwise there occur centres of explosion giving rise to local pressures of great intensity. It is here that the air-space comes to the aid of the artillerist, reducing during this critical period the tension, thereby permitting, while facilitating its simultaneous ignition, the combustion of large quantities of powder. Considering the ratios of the volume of the powder, and that of the space allotted it in rear of the projectile to the volume of the bore, and considering also the more perfect combustion of the powder, it is easy to see that, with even less tension in the chamber, higher velocity should be given than when no such space is employed; and that if the charge be increased with a corresponding increase of air-space, still higher velocities may be obtained. Finally, we may increase the diameter of the chamber, as compared with that of the bore; having regard, always, to the consequent relative increase of longitudinal stress resulting from the pressure of the gases upon the forward end of the chamber, and thus obtain a "dynamic head" of gas, which, generated in a chamber of fixed volume, will cause a flow of higher velocity through the bore than that which occurs when bores and chambers are of the same diameter; and thus, with comparatively moderate pressures, attain extraordinary velocities.

Not by an adjustment of combustion along the bore, but by a *flow*, analogous to that of an *air-gun;* or the more simple Indian reed, in which the sustained pressure of the air of a single inhalation imparts such velocity to the light arrow, with its gas-check of cotton or pith, as to render it an effective missile.

This has been illustrated by Krupp, with perforated prismatic powder combined with the air-space, and by the English with *pebble* powder and the air-space.

It is calculated that in the Meppen trials there may have been as much as forty per cent. of air-space in and around the cartridge in the chamber of the large Krupp guns (*London Times*, August 12, 1879).

Two of the guns tried at Meppen—Nos. 1 and 4 of the tabular record published in the *London Times*—excited special interest as compared, respectively, with the English 80-ton and 38-ton guns.

No. 1,—a "40-centimetre cannon for coast defense;" calibre, 15.75 inches; length (from front of breech-plug to muzzle), 26 feet and 5 inches; weight, 72 tons; length of powder-chamber, 5 feet 1.5 inches; diameter, 17.3 inches,—with a charge of 452 pounds of powder and a chilled shell of 1711 pounds, gave an initial velocity of 1648 feet, and 32.271 foot-tons of total energy, with gas-pressure in the chamber of 19.85 tons.

It was stated in the *London Standard* of August 30, 1879, that "this gun was intended to compete with the Woolwich gun of 80 tons. The highest result yet obtained with that gun consists in giving to a projectile weighing 1705 pounds a velocity of 1626 feet per second, the charge of powder being 460 pounds, and the energy imparted to the projectile 31.527 foot-tons." The same paper, of later date, September 12, 1879, contained an interesting description of the energetic application of the principle of the air-space by which the, until then undeveloped, power of the 80-ton gun was brought into play.

"The war-office authorities could not conveniently lengthen their guns, but they had been long convinced that the weapons had latent powers to be developed, and no time was lost in setting about improvement. Besides enlarging the bore, the order was given still further to scoop out the chamber, and by this means space was obtained for the effectual and deliberate consumption of the comparatively 'slow' gunpowder, which experience has proved to be of the greatest service in these enormous charges. The powder was carefully compounded, particular attention was paid to the air-spacing of the cartridge, and altogether it was hoped that if the performance did not quite equal that of Meppen, it would not fall far short of it. Yesterday one of the altered guns—and they are all precisely alike—was fired, and the results were astonishing. At the first round, which was merely a 'warmer,' with 425 pounds of powder, the velocity of the projectile was 1603 feet per second, and the projectiles weigh rather above 1760 pounds, or about the same as that of Herr Krupp. The full charge of 445 pounds of powder was then fired, and the electric recording instrument marked a velocity at the muzzle of 1657 feet per second, or a fraction of nine feet in excess of the German gun's velocity under almost precisely similar conditions. The officials engaged on the trial, to satisfy any doubts which might exist as to the accuracy of the test, again loaded the gun exactly as before, and again the speed of the great bolt was given in the instrument-room as 1657 feet per second."

No. 4,—the "long 24-centimetre ship's or coast gun;" calibre, 9½ inches; length, 17 feet 9 inches; weight, 18 tons; its powder-chamber 4 feet 2 inches long, and 11½ inches in diameter,—with 165 pounds of

powder and a chilled shell of 350 pounds, gave an initial velocity of 1910 feet, and a total energy of 8755 foot-tons, with a gas-pressure of 16.76 tons. In two special rounds with chilled shell, fired at armor, the initial velocity was 1915 feet. The armor consisted of two plates, the first 12 inches, and the second 8 inches thick, separated by 2 inches of wood, and supported by strong balks of timber. This compound plate was 163 yards from the gun. Both shells passed clean through, cracking the plates in various directions around the main circular aperture. One of the shells was shortened by 1.5 millimetres, and went 2406 yards after passing through the plates. The other passed also through a large balk of timber, and this one, which was shortened 2 millimetres, went only 1312 yards.

Of this gun a special correspondent of the *London Times*, writing from Munster, August 10, 1879, of the Meppen trials, says: "When we come to the consideration of power, the results are still more striking. The 24-centimetre gun weighs 18 tons, and the English 38-ton gun is capable of exerting about the same amount of power. The latter, firing a projectile weighing 812 pounds with 200 pounds of powder, developed 340 foot-tons per inch of circumference, and the shot passed through three plates of 6½ inches in thickness, and bent and broke a fourth, but failed to pierce it. It would probably be not unfair to say, therefore, that the Krupp guns are about equal in power of penetration to Woolwich guns of twice their weight."

The demonstrated success of Herr Krupp's endeavor to construct breech-loaders of extraordinary calibre, capable of resisting large charges, and apparently possessing the requisite powers of endurance, coupled with the now recognized mode of controlling the action of gunpowder, removes the ground upon which the most readily received objection to breech-loaders was based.

It was said that if muzzle-loading guns of massive proportions and solid breech, of forms and modes of construction in attaining which the resources of art and the properties of material had been wellnigh exhausted, were not certainly capable of sustaining commensurate charges, it would be useless to construct breech-loading guns, in which movable parts and corresponding apertures were substituted for that element of strength, a *solid breech*.

But there are considerations which warrant the belief that the breech of a breech-loading gun may be even stronger than the solid breech of a muzzle-loader of the same calibre. It is to be observed that in the Krupp system the place of application of the longitudinal pressure is transferred from the face of the breech-block to a considerable distance in the rear of what would be the bottom of the chamber in a muzzle-loader, and is distributed with much diminished intensity, in consequence of large extent of bearing-surface, upon a part of the gun free from the influence of radial pressure of the gases. Whereas, in the

muzzle-loader, the places (surfaces) of application of these two pressures intersect, producing increased local strain; nor can this effect be more than palliated by giving curved forms to the bottom of the chamber.

This principle—transfer of longitudinal pressure on the face of the breech-plug to parts of the gun sufficiently remote to be free from the influence of radial gas-pressure—is applicable to the slotted-screw-plug, which is now made to effect an approach, as nearly as possible, to the conditions of actual continuity which exist in a solid breech, the screw thread extending nearly to the forward end of the plug, which is light and handy. It may be added that in any system of *fermeture* there is liability to relative motion of the parts; and since velocities are inversely proportional to mass, while energy is proportional to the square of the velocity, the advantage of lightness of breech-plugs may be less than that of weight.

In determining the relative efficiency of guns, it is essential that the conditions of trial should be the same. In the first series of experiments by the "Committee on Explosives," in the course of which the bore was enlarged from 11.6 inches to 12 inches, to diminish the intensity of gas-pressures with moderate charges, the cartridge filled the space in rear of the projectile. Subsequently, at the suggestion of Major Noble, the air-space was employed to a limited extent. Yet, as recently as January, 1879, in the mode of charging the 12-inch 38-ton guns on board the "Thunderer," no air-space was allowed, and it is to be inferred that such was the general practice in the British navy with guns of that calibre. In the case of the "Thunderer's" gun, not only was no provision made for space, but it was found by actual measurement that with the "full" charge the relative position of studs and terminations of the grooves was such, there being no other check, as to permit the rammer to pass 5½ inches beyond the forward end of the 85-pound cartridge when home. In one experiment an 85-pound cartridge of pebble powder when rammed home by hydraulic pressure, care being taken to compress it as little as possible, was shortened 1.75 inches, and with full force of the rammer 2.45 inches. "The pebbles were not crushed or broken, but the charge was slightly dusty." This is sufficient to account for the abnormal condition of the powder-chamber of that gun, which was enlarged, and to confirm the opinion that the shell was fractured by the shock of discharge. On that fatal occasion the charge was rammed three times. But with the highest charge in the service for 38-ton guns of 12½-inch calibre, viz., 160 pounds, *sticks* were employed in the cartridge in order to prevent less space than 30 cubic inches per pound of powder being given to the charge when rammed home. (See "Minutes of Proceeding, 'Thunderer' Committee.")

This provision, regarding the allotted space between the base of the projectile and the bottom of the chamber as the measure of the powder

volume, would be equivalent to a gravimetric density of 0.92; without *sticks* it would be about 1.0.

Piobert's allowance would have reduced it to about 0.81, and Mordecai's to less than 0.7. In this connection it is interesting to observe that the 12½-inch 38-ton gun differed from the 12-inch only in the thickness of its steel tube, which was ¼ inch less than that of the 12-inch gun. It was, therefore, considered to be the weaker gun; yet its maximum service charge was greater than that of the 12-inch, in the ratio of 160 to 110.

The Woolwich guns have been subjected to very severe strains in consequence of the limited space allotted to the powder charge, and with the adoption of better modes of loading their endurance will be prolonged. It cannot, however, be immediately inferred from this that the advantages to be derived from the air-space and the employment of larger charges when applied to guns constructed upon the Armstrong system (muzzle- or breech-loading), are as great as when applied to breech-loading guns of the Krupp system.

In the experiments made at Tegel, near Berlin, in 1868, with a 9¼-inch Krupp breech-loader and a 9-inch Armstrong muzzle-loader, the former, firing prismatic powder, showed greater endurance than the English gun with pebble powder, the tube of the latter splitting.

This result might be attributed wholly to the higher initial tension of the pebble powder, but for the fact that in the experiments made at Steinfeld, Austria, with a Krupp breech-loader and an Armstrong muzzle-loader of the same weight, and calibre (9 inches), with equal charges of prismatic powder, and projectiles of equal weight, the Armstrong gun failed, the tube splitting as before.

The results of these experiments, with the often recurring "splitting of the tube," confirm the view so clearly presented by Commodore Simpson: "That the cause lies in the inability of a metal like wrought iron to properly support an elastic metal like steel." And this is illustrated by the comparative endurance of the steel tube in the experiments with Parson's converted *cast-iron* gun at GÂvre; as officially reported by the "Commission," April 29, 1865. Also by experiments in England with an 8-inch gun of the same kind, in which, with inordinate charges, the *exterior cast-iron* casing and a steel jacket reenforcing the steel tube, were cracked.

One effect of the Meppen experiments has been to excite emulation in attaining superior velocities; and, as success depends upon the charge, it is obvious that the requisite enlargement of the diameter of the chamber as compared with the diameter of the bore involves, in consequence of the pressure upon the forward part of the chamber, the consideration of increased strength to resist longitudinal forces. The wrought-iron coil is not so well adapted as the solid steel ingot to resist such forces; and in order to derive full benefit from the air-space, it

will be necessary to make such alterations in the existing Woolwich and Armstrong systems as may sensibly modify their characteristic features.

Moreover, with increase of chamber and charge, and corresponding increase of velocity of projectile in the forward part of the bore, shortening the time of passage, it becomes necessary, since impulse is the product of force into the time during which it acts, to prolong the action of the gases by increasing the length of the bore: thus maintaining the rate of acceleration.

It is, therefore, not improbable that the tendency will be rather to augment the capacity of the chamber and to increase the length of bore, than to preserve such forms as result from enlarging the chambers of the large guns of recent construction.

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REMINISCENCES OF PLEVNA.

THE name of Plevna has ground itself into history. Full twenty thousand men died fighting on the pretty vine-clad hills which surround the little town, and nearly three times that number there found wounds the effects of which they will carry through the rest of their shortened lives. It was the scene of one of the great sieges of history, accompanied with many bloody battles, and it is almost the synonym of the latest and fiercest of the many wars incident to the settlement of the Eastern question.

The town is made up of about a thousand houses, situated on wandering, crooked little streets such as only a Turkish town affords. Seen from the hills from which we watched it so long, it was a little clump of red-tiled roofs and whitewashed walls, with half a dozen staring white minarets raised above the surrounding roofs, and in the suburbs a large Christian church, with much green paint on the roof and a collection of gilded crosses above the cupolas. It nestles in a little valley at the junction of two meandering brooks, which unite at its lower end, and after a couple of miles discharge into a river about three feet deep and two hundred feet wide at ordinary seasons. On the west of this river, as seen from the bluffs on its eastern bank, the eye discovers nothing but a treeless plain, although in traveling over it it is found to be undulating; on the east the hills rise abruptly to the height of seven or eight hundred feet, and their crest at this altitude surrounds the town in a radius of five to six miles, the surface of this circle being broken into deep ravines by the brooks above mentioned and their branches.

The place has no military importance beyond that belonging to any junction of two high-roads and a few smaller ones. At the declaration of war it was an ordinary agricultural town; the surrounding hills were planted in corn and wheat and vines, and the inhabitants led that life of comparative peace—waiting for the opportunity to arrive when their smouldering hate should break out into violence against each other—which is characteristic of all mixed Mohammedan and Christian towns in Turkey. The events of the war, which I have no intention to narrate here, brought a Turkish army to the place and forced it to defend it to the last extremity; this, in turn, forced the Russians to concentrate their whole energy upon its capture; and both sides followed out their necessities to the bitter end. Three times in the space

of seven weeks the Russians attempted to take it by the brute force of an open assault, only to be each time defeated with ever-increasing slaughter. Then they turned their efforts to hermetically sealing it up from the outside world, and finally starved it out. The third and most bloody of these assaults—that of September 11—I witnessed from the batteries which contributed their share towards it, and it is of this one that I shall try to give a sketch.

On the 4th of September the headquarters of the Ninth Corps, commanded by General Krudener, with whom I was sojourning, were moved from one little village to another about ten miles east of Plevna. Then a halt was made, the preparations for the advance not yet being completed, and the whole of the 5th and of the 6th were passed in the nervous inaction of awaiting the development of events. They were cold, rainy days; nobody had more than the shelter of a tent-fly, and few had that; the sutlers moved about from point to point doing a thriving business; the officers ate prodigiously and drank freely; there was everywhere a forced but boisterous gayety. At sunset on the evening of the 6th the troops were formed and moved forward. They had only a few miles to go, but the night was dark and the road obstructed. The troops marched short distances only to halt for long intervals and lie down in the road for a nap, while we sat nodding on our horses. After a while the general and his staff rode forward to the head of the column. Some five hundred men were here working silently but most vigorously with their picks and spades, while others were placing gabions, fascines, and platforms in position. A regiment had been thrown forward about half a mile in advance as skirmishers and pickets to cover the construction of the battery, and the ear listened nervously to hear their first shot. But, save the hurried muffled noise of the spades and earth, no sound was audible. Soon after midnight the battery was completed, the eight siege-guns hauled into position, the ammunition stored in some sort of bomb-proofs, the troops disposed on either flank, and everything was ready for the morning. The general rode back a few hundred yards, and we dismounted and dozed there till daylight. As the day broke the whole Turkish position was in front of us, a couple of miles away. On our right was a high rounded hill, whose green slopes culminated in a low brownish mound, which we knew at once to be the great Krishin redoubt. Curving from this as an apex, on either side of the town, the lines of fortifications could be dimly made out in the twilight of dawn. Not a soul seemed to be stirring. The sun rose in a clear sky, and the lines became plainly distinguishable, and off on our left, on the brow of the Radishevo ridge, was also seen the freshly-turned earth of our own batteries. At six o'clock there was an explosion from the battery in front of us, followed by the vibrating scream of the shell, the sound of which gradually diminished in the distance; eleven seconds afterwards a cloud of dust was thrown up from the Krishin

parapet and greeted by a loud hurrah from the Russian troops. Immediately the parapet was lined with black dots, a hundred or more men jumping up to see what had happened, and a second later a horse galloped out from the redoubt towards the village, carrying, doubtless, a messenger to headquarters. The Turks are notoriously bad watchmen; a line of batteries had been built under their nose, and nearly ninety thousand men had gathered in front of them during the night without their pickets firing a shot; and apparently their first intimation of what had transpired was derived from this 90-pounder messenger of iron which had dropped in upon them. But they were not long in answering. Hardly a dozen shots had been fired from the various Russian batteries before a puff of smoke curled up from the Krishin parapet, and we saw the shell explode a long way in front of us. The second or third, however, fell squarely on the parapet, throwing the dirt in the faces of the Russian gunners, and one not long afterwards dropped in the bushes near our group, and caused us to move back to a more advantageous point of observation. The guns answered one another from every point of the two lines, and the ball was fairly opened.

It continued throughout the whole of this and the three succeeding days and nights, and grew monotonous. There were tentative infantry skirmishes here and there, developing almost into a battle at one point, but the characteristic feature of these four days was the cannonade. We watched it for hours with the glasses until our eyes grew dim; saw the dust of the exploding shells time after time in the very midst of the redoubts, and received the same in our own. The symmetry of the nicely-made Turkish works was sadly marred, and one gun after another seemed to be silenced; but the fire ever broke out in a new place, and still the stout piles of earth forming the parapets remained in place and warned the Russians that they could still give a murderous reception. The assaults had been originally intended for the 9th, but were postponed from day to day in the hope of their being made easier by the hammering of the artillery; but the dirt parapets were as uninviting as ever. The Grand Duke and his staff arrived and rode through all the batteries. Prince Charles, of Roumania, the nominal commander of the assembled troops, was daily on hand. The Emperor and his suite drove on to the field in barouches every morning, mounted their horses, and rode to one or another advantageous point of view; assembled at noon for a hearty lunch *al fresco*, and at dusk drove back to his headquarters at a village some ten miles in rear.

The thing began to drag. We rode from day to day from one end of the line to the other, we foreigners and newspaper correspondents (of which there were nearly twenty on the field) meeting at this point or that, and as we constantly discovered some new line of Turkish trench or battery which we had not previously seen, our bright enthusiasm of the first morning began to wane, and the dull, gloomy sus-

picion forced itself upon us that this was to be no holiday affair,—deciding the war at a single blow,—but a terrible battle, with the odds enormously against the chance of Russian success.

Finally the assaults were fixed for September 11, the Emperor's name-day. Four days' incessant bombardment had silenced nearly all the Turkish guns, which were far inferior in numbers and weight to those of the Russians; but it had also shown that the earthern parapets were practically but little injured, and that they would be in the same condition if bombarded for four weeks or months. Nevertheless, it was necessary to begin some time, and what better day than this? They have a sentimental fancy in Russia for anniversaries. For example, the negotiations for the treaty of San Stefano were allowed to drag on, through Turkish procrastination, for nearly five weeks, and were then brought to a conclusion in two or three days in time to be signed on the 3d of March (February 19, O. S.), the anniversary both of the Emperor's accession and of the signing of the ukase freeing the serfs. The 11th of September (August 30, O. S.) is the feast-day of St. Alexander Nevsky, one of the most famous saints in the Russian calendar, and therefore the feast-day also of all who bear the name of Alexander. What more graceful compliment to the Emperor, who had come to encourage his men by sharing the hardships of the campaign, than to link his name with that of the great decisive battle of the war, and to give him a great victory as a name-day present?—as General Sherman offered the city of Savannah to Mr. Lincoln for a Christmas gift in 1864.

During the night of the 10th the rain fell in torrents; this was succeeded by a fog and mist so dense that it was hard to tell when day broke, and when our watches told us it must be broad daylight, nothing could be seen at the distance of a few hundred yards. Nearly all the regiments had left their knapsacks and shelter-tents at the villages where they had bivouacked a few days before, and had nothing with them but their muskets, cartridges, overcoats, and a small amount of rations. The men awoke cold, wet, and stiff; the ground was covered with a slimy paste of mud; the air was raw and damp. It was altogether a most dismal day.

The assaults had been fixed for three o'clock in the afternoon, and were to be preceded by an elaborate artillery programme, which, however, was altogether disconcerted by the fog. Early in the morning a sharp rattle was heard through the mist from Skobeleff's position, off on the left; and the troops in the centre became involved in a very brisk affair, in which they lost over two thousand men without any advantage whatever. The Emperor arrived before noon, and, with the Grand Duke, Prince Charles, and their numerous suites, took up a very advantageous position (had there been no fog) on a hill near the right of the Russian lines, from which, on a clear day, the whole position could be very distinctly seen.

The fog lifted and settled again during the day; the artillery burst forth from time to time, occasionally mingled with the rattling from the picket lines; the men lay in the mud, behind the shelter of the various hills and ridges, chatting, joking, and making as merry as possible in their dismal surroundings. At three o'clock, on every part of the line the troops were formed and moved forward, grouped in three principal columns for assault on three specified points. In company with some German newspaper correspondents, I selected a good point of observation, a few yards from the batteries on the left of the Radishevo ridge, and nearly at the centre of the whole line, and we watched the assault at that point. The hill on which we stood was fully one hundred and fifty feet higher than the Turkish redoubt known as No. 10 on the Russian maps, and about two thousand five hundred yards from it. The hill sloped gently from us, and completely overlooked the whole basin—filled with redoubts and batteries—to the commanding ridge of Krishin, opposite to us, and about three miles distant. While the guns redoubled their activity, firing with the utmost rapidity and a deafening racket, the infantry slowly filed past us in column of platoons, the men looking serious, but not sad, and crossing themselves and muttering their prayers incessantly as they passed the brow of the hill and moved down the slope. When they arrived at the base of it they were under the shelter of a little ravine, and the redoubt (No. 10) lay on their left, and about fifteen hundred yards from them, the greater part of this distance being nearly level, or sloping gently up to the redoubt, part of it covered with standing corn, and part of it (the greater part) entirely open, the corn having been cut.

The troops composing this particular column numbered six battalions, or about five thousand men; when they reached the little ravine just mentioned, they halted and lay down for a few minutes of rest; then they turned by the left flank, and, leaving one battalion in reserve, moved forward in line, the centre battalion being in company column. They were not long in coming on the brow of the slope leading to the redoubt, and in full view of it. They moved forward, preserving a fair alignment, steadily, slowly, grandly. Nothing can be finer as a mere spectacle than the sight of a line of troops moving forward with blind, unthinking obedience and faith into battle.

They were fully twelve hundred yards from the Turkish redoubt when the smoke began to curl up along the line of its parapet, and the pop, pop, of its muskets gradually increased in sound till it resembled the drummers' long roll. The fog had partly lifted, and the redoubt, as well as other parts of the field, could be fairly well seen; the Russians answered back at the Turks and still kept advancing. The columns on either side of us were by this time also fully engaged, the din was very considerable, and the smoke was beginning to collect in low, dense clouds, gradually drifting across the landscape before the wind.

The Russian line gradually moved on; to us above them, and some distance on one side, the rate of progress seemed terribly slow, but it never halted. Individual men could be seen running forward, firing and falling; a few others in the rear moving back, throwing up their arms and falling, but the main line—a black, irregular, waving band, of which the individuals could only be distinguished by the glass—still stretched across the stubble-field, and still moved on. Finally they had passed half the space from the little ravine to the redoubt, and then they stopped and lay down, and the firing increased in rapidity. A few minutes later they got up again, the centre battalion now deployed in line, and again moved forward. They were soon so near the redoubt that the batteries near us ceased firing for fear of injuring their own men; the gunners leaned on their pieces watching their comrades below, and the silence in our neighborhood was oppressive, although the more distant noise became ever louder and more boisterous. Finally the line of Russians seemed to be within only one hundred or two hundred yards of the redoubt; the line could be seen to break into a run, and then all was lost in a confused mass of smoke, through which the fire from the muzzles leaped back and forth from end to end of the parapet, like flashes of lightning, and out of which was heard the sharp, continuous rattle of the muskets, but no individual sound. It was the critical moment; nothing was in sight but the cloud of smoke, and we held our breath in suspense awaiting the result. My God! they are coming back! Black dots began to emerge from the smoke, increasing in numbers, until it was seen to be the whole line, confused and irregular, but still intact, gradually moving back to the rear. The sound of shouts came through the smoke, and now the fire of the Turks seemed to increase with the fury of hell itself. As the smoke partly blew away, the parapet seemed made of sheets of flame; and outside of the redoubt there was a regiment or more of Turks fighting in the open, and still others behind them climbing the slope from the direction of Plevna. And now a mass of black objects were seen streaming over the parapet at one corner, jumping and running forward towards the retreating Russians. The Turks were following up their victory. But this lasted but a few minutes. The Russian line stopped, turned, lay down, and sent back a greeting of death as warm as that which they were receiving. It was but a second before the Turks were swarming back into their redoubt as rapidly as they had come out. Then the Russians got up and continued their retreat,—a few running, but the great mass steadily walking in a confused line, stopping now and then to return the fire. As they retreated, the battalion which had been left in reserve came hurrying forward at a run, but it was a bagatelle in strength, and merely joined their comrades and returned with them. The whole lot were soon back under the shelter of the ravine again. It was a little over thirty minutes since they had

left it to advance; and fifteen hundred of their number now lay in the furrows among the corn-stalks. The Turkish hurrahs came echoing over the field; their men stood defiantly on the parapet; the Russians sat exhausted and bewildered under the shelter of their little ravine; the firing simmered down to a few scattered shots; soon it ceased altogether, and was succeeded by the stillness of death, in painful contrast to the noise of a few minutes before. The stubble-field was covered here and there with black objects. Three of them were noticed to rise, and two began to run; then the firing recommenced; thousands of bullets came chasing after these three lone objects; first one threw up his hands and plunged headlong on his face, then the other; the third went on at a walk, defiantly, with head erect, swinging his arms; then, either losing his nerve, or stung with a bullet, he began to run, but before he had gone ten steps he too fell headlong. Everything was quiet again, and over the whole field not an object moved.

Meanwhile, the distant firing continued uninterruptedly on both sides of us, but we could make nothing of it through the fog and smoke, and our hearts were too sick with what we had just seen to feel much interest in it. If nothing could be finer than their advance half an hour ago, certainly nothing could be sadder than the sight before us now. Brave men had done their best, one in four giving up his life in the effort, but they could not accomplish the impossible. They came slowly up the hill again to where we stood, their faces sad, but not panic-stricken, filed down the reverse slope, stacked arms, and lay down to sleep, overcome with fatigue and bewilderment.

As they passed by us, another disjointed attack was going on against the same redoubt by other troops off to our left. The assaults were not simultaneous, and the Turks had only to turn to the other side of their work to drive back this more easily than they did the first, for it was not pushed so far. The line was withdrawn, the fire slackened, and darkness, smoke, and fog gradually settled over the whole field. The sun, which never shone, had set on the Emperor's name-day, and his name-day gift was only a roll of five thousand killed and ten thousand wounded of his own subjects, without counting the losses of his gallant young allies, the Roumanians, who had borne the principal part in the assault on our right against the Krishin redoubt.

I turned my horse down the hill and met a party of English correspondents and the English military attaché, who had witnessed the same struggle as myself from a point a few hundred yards to the left; leaving them, I rode rapidly over to the Emperor's point of observation. On my way I met the younger Grand Duke Nicholas, who eagerly questioned me for information, and then galloped on to relate it to his father. When I came up the elder Grand Duke was standing at the steps of the Emperor's carriage. As the Emperor returned my salute, I got a good look at his face; his expression was

sad and very thoughtful, but still dignified. It seemed simply as if he had an unusual load of care in addition to that which his face habitually gave signs of. The two brothers kissed on the cheek after the Russian fashion, and the Emperor drove off, followed by the carriages and cavaliers of his suite, and the half-wild, grotesquely-dressed Cossacks of his escort. What must have been his thoughts during this ten miles' drive in the drizzling rain and darkness! Fortunately, being but a man, he could not realize it all. Could he feel the measure of his misfortune in the same proportion that a captain of a company in that death's hollow near him felt his, the weight of it would grind him to powder.

I dismounted as the Emperor drove off, and the Grand Duke beckoned to me, took my arm, and walked a few steps to one side, saying in English, "Come, tell me what is this?" It seemed that I was the first officer to arrive from that part of the field which I had witnessed. I told him in short what I had seen,—that the assault had been most gallant, but had totally failed; that the losses could not be less than twenty-five per cent.; that the failure was due to a lack of *ensemble* in the attacks; and that everything was now quiet, the Turks making no signs of taking the offensive. He listened intently, asking a few questions, and then noticing that his staff had gathered around us, terminated the conversation by remarking, "Beautiful evening, is it not?" (the rain had just begun falling rapidly) and moved off.

Near by were a dozen carriages belonging to the Grand Duke and some of his staff. The rest of the officers and the headquarter escort had nothing but their overcoats. Some Cossacks were sent off to the stacks of grain piled on the sides of the hill, and bringing it in, they made a bonfire, and we gathered around it. At that time the news from the Krishin redoubt was that three desperate assaults had been made by the Roumanians, assisted by a Russian brigade, and that all three had been repulsed with great loss. From the centre the news was what we have seen. From Skobeleff, away off on the extreme left, the latest information was several hours old; it was to the effect that he had carried one of the redoubts near the town on the Lovtcha road, but the fighting was still going on unabated, and the result could not be predicted. On all sides there was nearly the same sad story of defeat. It was a gloomy evening; the air was cold, and full of a sharp, fine rain. We were most of us wet through, and, more depressing than all, in those corn-fields and vineyards between us and the town lay the fifty thousand or more men who had passed through the fiery furnace of to-day's battle, and who had done their duty in it so loyally though with so little success,—many of them lay dead, others in agony longing for death, and the rest in their troubled sleep thanking God that this day was over and they still lived, but wondering whether they would be able to say as much twenty-four hours hence.

As we sat chattering around the fire, the sound of a horse on a hard gallop through the mud was heard, and in a minute there jumped into the group Genghis Khan, a major-general in the Emperor's suite, and descendant of the famous conqueror of the thirteenth century,—a great, burly, good-natured creature, with high cheek-bones and black hair and beard, almost a perfect type of the Tartar as depicted in the child's geography. He had been sent to learn something of the course of events near the centre of the line, and in returning past the village of Krishin he had nearly galloped over a man in the road, who told him he was carrying a message to a brigade commander for more troops to garrison the Krishin redoubt; that the redoubt was actually taken, and he had himself been in it! This tale was listened to with wide-open mouths and eyes and ears. Two officers were immediately sent off to verify the report; they went splashing away through the mud and darkness and were soon out of hearing.

Then the Grand Duke stepped over to Prince Charles's carriage, woke him up, told him the news, and suggested certain orders for the Roumanian troops, insisting that this or that should be attended to in order that the redoubt might be held when day broke and the Turks tried to regain it.

Before the Roumanian officers rushing off with these orders were out of sound, up dashed another young major-general named Stroukoff, a handsome young fellow of thirty-two, with long blonde moustaches. He had been sent to the Krishin troops for news before dark, and had entered the great redoubt with them. He had been riding post-haste to bring the news, but had lost his way in the darkness, and so Genghis, with his second-hand account, had arrived first. Stroukoff corroborated all that Genghis had told, and gave the details of the final capture of the redoubt just after dark; the Turks had fought to the last with curses of defiance, refusing to surrender, and the last remnant of the little garrison had perished by the bayonet.

The fate of the Krishin redoubt being settled, at least till morning, the Grand Duke prepared to go to sleep,—it was between ten and eleven o'clock,—leaving word that the first messenger from Skobeleff should come to him immediately upon his arrival. There were about a dozen carriages here, belonging to the Grand Duke and the more important members of his staff; the horses were unharnessed and hitched to the poles, the curtains and boots were unrolled and fastened together, making very passable places for a nap. Others lay on the ground under the carriages, and the rest found what shelter they could. For myself, I picked out a place not far from the fire, where a small bush formed a partial protection against the piercing cold wind and mist. I had no cover with me but a ten-ounce mackintosh overcoat, and I wrapped this round my shoulders, though with no particular object, for they were thoroughly wet. I soon found I had made a bad

selection, being directly in the line between the embers of the fire and the carriages. After three or four men, with their big boots and spurs and sabres, had fallen over me, I concluded to change, and found a more quiet place, although it was openly exposed to the cutting wind.

In this dismal situation we struggled for a few winks of sleep throughout the long hours of the cold night. Towards morning it cleared, with a high wind, and the stars came out, and just at daybreak several wagons drove up with food from the Grand Duke's commissariat. There was bread, cold mutton, a few eggs, and a great brass "samovar" five feet high and holding sixty gallons. We were soon drinking tea by the quart and devouring cold mutton by the pound, few of us having had anything to eat in nearly twenty-four hours. Our stiff joints and rheumatic backs began to loosen and lubricate, and our spirits rose accordingly. The sun soon rose bright and clear, disclosing the whole field and drying our clothes. Smoke could be seen rising from the woods of Skobeleff's position on the extreme left, about six miles from us in a straight line over the heads of the Turks; there was also some firing going on around the Krishin redoubt. Word had been received during the night from Skobeleff explaining his precarious position, and answer was sent back to him at seven A.M. to retreat slowly, for no reinforcements could be sent to him.

About eight o'clock the Emperor and his suite drove up, and we all rode forward about half a mile to the point of the hill, and there strained our eyes through the glasses trying to make out what was going on with Skobeleff, away off on the other side of Plevna. We could plainly see two dark lines of troops hotly engaged and moving backward and forward, but, being ignorant of the details of the topography of that vicinity, and almost equally ignorant of the actual course of events in Skobeleff's command, we could not make out anything definite as to what was going on, or even which side was Russian and which Turkish troops. I stepped over to General Levitzky, the assistant chief of staff, and discussed with him the probabilities as to which was which. He knew no more about it than I did. We could only see that a very hot fight was going on. We watched it for two or three hours, and then the Emperor mounted and rode back to the site of our bivouac of the night before. About noon a lunch was served of cold meats and preserves, bread, biscuits, and an abundance of claret and champagne. An improvised table was set up for the Emperor, his brother, his nephew, the Duke of Leuchtenberg, Prince Charles of Roumania, old Prince Suwaroff, and the Minister of War. The rest of us, numbering nearly a hundred in all, squatted about on the ground, —but the lunch was very good. After it was over the improvised table was used for a council of war, in which the Emperor, the Grand Duke, the Prince of Roumania, the Minister of War, the chief of staff, his assistant, and the chief of staff of Prince Charles, all took

part. It lasted during the greater part of the afternoon. The air was warm and sunny, and we sat about in groups chatting and enjoying the balmy air as at a picnic in early spring. Meanwhile, the smoke was still curling up from the woods over where Skobeleff's troops were, and we could just distinguish the noise of their musketry fire. We did not know it, but just then his terrible two-days' fight, in which he lost eight thousand men out of eighteen thousand, was culminating, and he was beginning to withdraw as best he could the remnants of his troops. The council finally broke up late in the afternoon, and the Emperor drove off. It was told to us, in general terms, that it had been determined to make no more assaults on this position which had already cost the Russians thirty thousand men, but to remain in *statu quo*, fortify their own positions against any counter-attack, and await the arrival of the reinforcements which were already *en route* from Russia. Upon their arrival the place would be regularly invested and besieged, if the Turks did not meantime evacuate it.

So ended this memorable assault,—at least the acute part of it. Its effects,—the long lines of creaking little carts, which could be seen any day for a week afterwards carrying men groaning with wounds to the Danube,—the unburied dead which lay in plain sight in front of the Turkish redoubts for the next three weeks, until the terrible stench compelled the Turks, in self-defense, to throw a few spadefuls of earth over them; these and other horrors, necessary and unnecessary, I have no desire to dilate upon.

On the 10th of December Plevna fell. On that day Osman Pasha found his provisions reduced to but a few days' supply, and saw that the place which he had so gallantly and stubbornly, though perhaps unadvisedly, defended for nearly five long months, was at last doomed to fall through starvation. But he would make no tame surrender, like Bazaine and Pemberton, of mere hungry mouths; if perish it must, his army should perish in the hot blood of battle. Massing all his troops during the night, he broke forth at daylight, striving to pierce the Russian lines on the west side and escape to the Balkans. It was one of the maddest, fiercest, least hopeful onslaughts ever made; it swept over the first two Russian lines like a whirlwind, and was barely checked at the third and last. But once checked, the Russians closed in on every side, and by noon Osman was wounded and his army was a mass of angry, stupefied human beings, without cohesion and without leaders. A few hours later it marched back with sullen faces within its own lines, laid down its arms in the ditches along the road, and became a mere herd of ill-fed, ill-clothed prisoners of war.

I was not at Plevna on the 10th. Sharing the feeling then current that the siege might last for several months, and weary of walking through the muddy trenches and conning for the thousandth time with

field-glasses the outlines of the Turkish redoubts, I had joined General Gunko, who was leading a detachment of about forty thousand men into the Balkans, near Sophia, to prevent any reinforcements or supplies from coming to Plevna. Hearing of the surrender by the field telegraph, I rode back as rapidly as possible, and reached Plevna about noon on the 13th. The burying-parties were still busy on various parts of the field. At the first one I met, an officer of the grenadiers was seated on the ground eating a few bits of hard bread and sausage for lunch. A dozen yards from him was a trench sixty feet long and twelve feet wide about half full of bodies. The men of his detachment were moving over the field picking up the dead Russians, straightening them out, and rolling them up in their overcoats; they were then brought to the trench and dropped in it with some uniformity, heads and feet alternating, like sardines in a box. When about two hundred had been put in the trench, it was filled over with earth, a short service read by the chaplain, and a good many signs of the cross made by the men; a rude wooden cross, with two cross-pieces, after the fashion of the Greek Church, was then placed over it, and the burial was over. So fared the dead Russians. For the Turks the process was somewhat abridged: the little batteries and trenches which covered the field, and whose parapets bore the footprints of many a fierce hand-to-hand fight three days before, were now utilized for graves; the Turkish bodies were first stripped of their clothing for immediate use, it being in many instances superior to what the Russians had themselves, and they were then dragged to the nearest battery and tumbled headlong into the ditch. There the naked bodies lay, their arms and legs tangled in inextricable confusion, reminding one of Doré's illustrations of "The Inferno." When the ditch was nearly full the loose earth was shoveled down from the parapet to cover the bodies, and the ceremony was complete.

I had been riding over the field among these scenes, gleaning as much as possible from the survivors of the events of the battle, and had grown somewhat hardened to the sickening sight, when suddenly, on passing near a ditch full of naked bodies, my horse plunged violently and stood quivering and snorting with fear. Among the corpses was a living man; his head and one arm only were visible among the tangled mass of bodies and legs; his face was purple, and he was already so far gone as to be speechless; with his hand he beckoned very faintly to me to come near, and in his face and eyes there was the most ghastly death-agony I have ever witnessed. I called a passing soldier to bring some water; he replied he had seen none since early morning; there was none on the field nearer than the river, two versts off; my own brandy-flask and cigarette-case I had emptied a few minutes before among a group of wounded. There was nothing to be done for this poor fellow, and I moved on; he was probably dead before many minutes. For all the volumes that have been written in all the ages

of the horrors of the battle-field after the battle, how little do they or can they portray its reality!

War is at best brutal and brutifying; in the midst of it men are too busy with the object to be attained to have any time for human sentiment, and they think of their fellow-men as mere units, like horses, guns, muskets, and wagons. Afterwards, when the brain is less heated, its daily events group themselves together in the memory like a confused and unreal nightmare, of which some more than usually vivid scenes are the only tangible features.

The next day the Emperor came over to the field to review the troops, thank them for their victory, and take leave of them prior to his departure for St. Petersburg. From the Grand Duke's headquarters, at Bogot, to the battle-field, near Dolni-Etropol, the distance was fully fifteen miles. It was a cold, drizzling day, and I gladly accepted the invitation of one of my colleagues to take a seat in his barouche and send my horse on ahead by an orderly.

The scene in the town of Plevna just after the surrender defies all description. The lack of ready wit of the Russian Tchinovniks, the total want of transport and medical service of the Turks, the vast numbers of sick which had accumulated during the bad weather of the last few weeks of the siege, the vile, filthy streets of the dirty little Turkish town, all combined to make up a scene whose like I doubt has been witnessed since the plagues of the middle ages. You could barely open a door on any street without the chance of stumbling over two or three corpses in the hall,—men who had crept in there to die of their fevers. The yards of the houses presented nearly the same spectacle; no sanitary precautions seemed to have been taken, and the yards and streets were one foul mass of filth and mud, which combined with the stench of dead bodies to make the place a vast pest-house. Many of the houses had been destroyed by the bombardment; all those belonging to Turks had been deserted by their owners. The streets were filled as in a mass-meeting,—Bulgarians, Russian soldiers, creaking carts full of wounded, supply-wagons, artillery-wagons, horsemen, all blocking one another's way without order or direction. It seemed as if Pandemonium had settled down in the mud of this filthy village. On this day two long rows of gendarmes lined the streets, shunting every vehicle or being into the nearest by-way or yard, and keeping a single, continuous passage open for the carriages of the Emperor and his suite. As we emerged from the farther end of the village we came upon another striking scene; it was a collection of not less than twelve hundred carts, each with a pair of uncouth buffaloes tied to the end of the pole, and all crowded into a space so small that it was barely possible for a person to thread his way on foot between them. In this caravan were all the camp-followers of Osman's army and the Mohammedan inhabitants of the town. They had been brought together by Osman with

orders to follow his troops the moment he should break the Russian lines. Here they had been for four days. Standing like a fringe along the front were the men, dressed in every variety of gayly-colored and picturesque Oriental costume, staring in silence at us as we passed, with stolid indifference or sullen defiance on their faces; behind them, peering from under the covers of the carts or playing about the wheels, were the women, dressed in blue or yellow gowns, the "yashmak" tightly drawn over their faces, and the children laughing or gaping with wonder as they toddled about in their striped baggy trowsers.

Across the river, on the wide plain where the battle had been fought, were the prisoners, herded together like cattle in three great herds, about ten thousand in each, and a line of Russian sentries around the outer edge. The Russians had not tents or blankets enough for themselves, the Turks had none whatever, and the miserable town afforded no facilities for shelter; there seemed to be no way to guard them but the way that we saw. We had arrived an hour or more before the time fixed for the Emperor, and I passed the interval wandering through the midst of the herds of prisoners. More than half of them were hearty, stout-looking fellows, with deep, broad chests, and well-knit muscular frames; among the others were many whose emaciated and sallow faces told of the bad food and suffering in the trenches. Not a few were crouched on the ground, shivering with the cold wind and the still colder hand of death which was beginning to rest upon them. For clothing every man wore the Turkish fez, and a majority had a rather shoddy overcoat with a capote; further than that there was no uniformity, the dress being of every variety, from the rudest of home-spun to a handsome suit of stout blue cloth, cut *à la Zouave*, and adorned with red or yellow trimmings. They were badly shod, great numbers of them having no other protection for the feet and ankles but raw-hide tied with strings. The expression of these men was, as a rule, frank and gentle; but there were many scowling, defiant, and savage faces. I found a few who could speak some words of French, enough to tell me that they had not tasted food since the morning of the battle, four days before; they had been all this time herded in the open as now, their position being moved once in twenty-four hours to avoid the accumulated filth, and to give an opportunity to bury those who had died meantime.

The Emperor arrived about one o'clock. The troops formed for review consisted of the corps of grenadiers, three brigades of Roumanians, a division of cavalry, and one hundred and eighty guns,—about fifty thousand men in all. They were drawn up, about half a mile from the herds of prisoners, in the usual Russian fashion,—the cavalry on the flanks, the infantry in a line of battalion masses (double column of platoons on the centre), and the artillery in rear of the infantry. Even in this compact formation the troops of the three arms

covered a space over a mile long and half a mile deep. The review was conducted in the customary form. The commanding general—in this case the Grand Duke Nicholas—took his position on the right of the line, with his staff immediately in rear of him. As the Emperor and his suite approached, the Grand Duke galloped out alone to meet him, saluted, and handed him the consolidated report of the troops present. The Emperor then rode along the front of the line, the Grand Duke's staff joining in the suite, swelling its numbers to nearly three hundred. As he approached each regiment the men presented arms and the officers saluted, all turning their heads towards him and watching him with the most intense interest. He then called out, "Zdarova, Astrakhansky!" (Moscovsky, or whatever were the name of the regiment), meaning "Good-morning, men of Astrakhan!" The two thousand or more men of each regiment then answered back in unison with one long, rolling shout, "Zdravie zhelaiem, Vass Imperatorsky Veleetchestvo!"—"We wish good health to your Imperial Majesty!" Then the regimental band struck up the national hymn,—an air whose grand harmony is long remembered by those who have heard it,—and the men kept up an uninterrupted series of hurrahs so long as the Emperor remained in their front. Now and then the Emperor stopped to call out some soldier wearing the St. George's Cross, and ask him to relate the circumstances under which he had gained it. The answers were usually brief and modest, and the Emperor would compliment him at the end with "Tee molodetz!"—"Thou art a fine fellow!" and the man would grasp his hand, his sleeve, his skirts, and cover them with kisses, often dropping his musket in the confusion of a moment which he would remember to the last day of his life, and which he considered ample reward for any sacrifice or risk of life. Opposite the regiments of Siberia and Little Russia, which had borne the fiercest part of the Turkish assault, the Emperor stopped and called the officers about him to make a short speech of a few appropriate words, telling them their regiment had earned its place in Russian history, and would henceforth carry the colors of St. George entwined on its standards. It was more than an hour before the Emperor had finished riding down the line of infantry, and thence back to the other flank and down the lines of batteries, each of which was saluted in turn by name. Then the Emperor took position in front, and the troops filed past him, consuming something more than another hour. The infantry went past in company fronts (two hundred men each), and to those who preserved a good alignment the Emperor shouted, "Koroshoh!"—"Very well!" to which the men yelled back, "Otchen radom, Vass Imperatorsky Veleetchestvo!"—"We're glad to serve your Majesty!" Each regiment after filing past returned directly to its own quarters, and then the Emperor and suite rode back to their carriages and returned in them, giving their saddle-horses to their orderlies.

One often sees reviews,—the hopeful, bright recruits setting out for the war, the saddened veterans returning with thinned ranks,—reviews at great ceremonies, reviews for mere inspection or drill. They do not vary greatly in different countries; the men are usually dressed in their best, their arms are bright, the ground is well selected, the movements are precise, the scene is brilliant. But it is rare that they have an air of reality about them; the most they tell of actual war is occasionally some reference to their fallen comrades, such as leaving gaps in the ranks where they had stood. But this review was none of these. It was a review of the survivors of a battle fought but four days before, and it was held on the very ground where they had fought, and in full sight of the men they had conquered. It seemed to me to be most intensely dramatic, and full of a vivid savagery, which had nothing in common with the grand march of Grant's and Sherman's armies along Pennsylvania Avenue in April, 1865, but rather to recall the stories of the old Roman triumphs, where the conquered were dragged through the streets chained to the chariot-wheels. It represented all that there is in the pomp and circumstance of glorious war, —and all its emptiness. Here were fifty thousand men, victors in a great battle, shivering, with their gaping boots in the mud, but shouting themselves hoarse at the sight of their beloved Emperor, who typified to them all they had fought for; over yonder, listening to their shouts, were herds of disorganized men, the remnants of soldiers who had but a few hours before met them in fierce fight, but who now had no shouting to do, no commendation to receive, no future, but a dull blank in their minds; no feelings but suppressed rage, alternating with the gnawings of hunger; and between the two groups lay the carcasses of horses, pieces of clothing, parts of belts and cartridge-boxes, broken ammunition and wheels, and all the numerous odds and ends which lie strewn on every battle-field, including here and there a dead man who had escaped the notice of the burying-parties. Yet the two enemies, the victors and the vanquished, have an almost equal claim to every soldier's admiration; without stopping to inquire into the justice of the causes for which they respectively fought, or into the errors which their commanders had made, but thinking merely of the great mass of the soldiers on either side, one can only recall that in the historical drama of Plevna which this day's review closed, both sides had shown qualities of endurance and devotion, of daring spirit and dogged courage, of faithful obedience and cheerful sacrifice, of all those soldierly qualities which in all the ages have commanded the admiration of men. But one quality had they lacked,—that of mercy to their fallen foes,—and in a war of religious fanaticism perhaps this could hardly be expected.

F. V. Greene.

AN ISLAND IN THE AIR.

THE villa is lonely, and dim with perfume
Dript from the acacia's dangling bloom;
By marble statues that glimmer in gloom
Of ilex-alleys, I only and they
Stand mutely at gaze o'er the marvelous bay
Of Naples, changed since yesterday.

As clear is the soft blue sky aboon,
But distant hills of Sorrento swoon
In swimming vapors of slumberous noon;
And all along in the mists so fine
I trace the throbbing horizon-line;
But lo! of Capri is not a sign.

Blue as Parthenope's gem should be,
A crystallization of air and sea,
A mountain of lapis lazuli,
It seemed; and I saw the sunset drape
In purple on purple its angular shape,
Clear-cut on mid-arc between cape and cape.

And now what witchery hath been wrought
By Siren or Nymph of its Azure Grot,
That I gaze, and gaze, and behold it not?
Like the lost Pleiad vanished and gone,
Or is it but into the deep withdrawn,
As into heaven the star of dawn?

I have read in the legend quaint of Saint Brandan
That God at the Deluge did not abandon
His Garden to be destroyed, but grand on
The waters it floated—still floats and flies;
And fringes of eventide mock our eyes
With that islanded glory of Paradise.

An isle like Saint Brandan's I hold in fee,
Which only at charmèd times I sée,
But whose secret fragrance is sweet to me.
An isle like Capri in veiled repose,
From dreamy deeps 'tis revealed like the rose
On the cheek, when an exquisite feeling glows.

It hath valleys of sempiternal green,
It hath snow-pure peaks where the heavens lean,
And the heavens and the waves are forever serene;
And the beings therein are redeemed from ruth,
And their hearts are green with perpetual youth,
And their souls are white as the heights of Truth.

From the lake to the sea, from sleep to sleep,
The streamlets that run, and trip, and leap,
A typical freshness of childhood keep;
They sing, "Our faces are forward set,
We pursue, we pursue with desire, and yet
We have nothing—oh! never a thing to regret!"

There common words are as sweet as songs,
For never a man his neighbor wrongs,
And woman is safe from slanderous tongues.
In the golden grace of an age antique,
The best is of his own virtues meek,
And the strong is merciful to the weak.

From envy, starved in the lack of scorn,
From the selfishness that makes earth forlorn,
My little world's free as a world unborn.
But friendships all loyal no chills estrange,
And tenderer passion doth only range,
Like its planet, from change to lovelier change.

Do you tell me my island doth not exist?
Ah! it hides in its own ambrosial mist,
Like Capri now curtained in amethyst;
And as surely as Capri unseen is there,
It dwells in God's possible. Who shall dare
To say it is hopeless, my Island in Air?

WILLIAM GIBSON,
Commander U. S. Navy.

RECOLLECTIONS OF THE PARAGUAY EXPEDITION.

In the year 1858, while the U. S. brig "——," of the Brazil squadron, was lying at Montevideo, a report came down upon the northern breeze that our government was about to take serious measures in regard to the injuries and insults which had been sustained by our surveying vessel, the "Water-Witch," and by certain American citizens, at the hands of the Paraguayans.

The officers of the brig were young and ambitious, and they fancied they scented war, "a bloody war and a sickly season," up the river. This was natural enough when we consider that there had been no powder burned, to speak of, since the close of the Mexican war,—more than ten years before,—and that the station upon which these officers found themselves had become a very sleepy one since Rosas had been driven out. A chance of any change, especially of "service," was, therefore, exciting news.

The officers discussed the situation and the *pros* and *cons* in a very lively way, each one having a perfect plan for an expedition up the river, and all agreeing that, if the "——" could only be towed up by a steamer, she would easily, single-handed, demolish the Paraguayan batteries, disperse their army, and dictate terms of peace at Assunçion.

Dear, good fellows, all of them! Nearly all saw fighting enough afterwards, with the scene laid north, instead of south, of the equator, in the momentous war which has caused the Paraguay Expedition to be almost forgotten, even by those who took a part in it.

The ward-room steward of the little vessel, a worthy Virginian negro, loitered and listened, with open ears, to all this loose talk of the officers, and very naturally judged, from what he heard, that the decks of the "——" were soon to run red with gore. The ghastly picture conjured up in his mind's eye so worked upon the steward that he forthwith "ran,"—deserted, in fact,—leaving behind him, in his escape from imaginary peril, all his wages, as well as abandoning all the privileges and emoluments of a ward-room steward. The reason for his action (given to his confidants and familiars) was, "that he had 'listed for ward-room steward, and not for no *Paregoric war!*"

Unfortunately for the poor steward, he was not aware of the mode

of recruiting the Oriental or Uruguayan army. Had he been, he never would have deserted at Montevideo. I forget whether, at that time, there had just been a "revolution," or there was just going to be one, but, at any rate, they wanted soldiers, and had no prejudice against colored ones. A deserter from a ship was a godsend, and the steward was at once snapped up, and made a high private in the national army, where the discipline was rude and accompanied by stick, and where the pay was—0.

One day, some time after the steward's disappearance, some of the officers of the brig were walking out of the land-gate of the town, when their attention was attracted by the very curious behavior of a sentinel on post there, who, with his piece at a "present," and perfectly rigid as to person, was making most horrible contortions of eyes and facial muscles. Drawing nearer, they recognized, under the Oriental uniform, their runaway steward; and, as they passed him, the poor fellow gasped out, "For God's sake, dear gen'lemen, git me out o' dis fix! I'd rather sarve in de Paregoric war!" Needless to say that the poor fellow was promptly reclaimed, and, after undergoing the necessary penance, went cheerfully about his business,—going to market, superintending the table, and opening wine and beer for the officers; cheating the latter moderately in these operations, of course, after the manner of ward-room stewards.

This humble individual had the distinction of giving the name by which the expedition was best known to those who participated in it—the Paregoric war,—not very badly named, either.

And now let us see what the Paraguay Expedition was, and against what manner of people it was dispatched.

Paraguay had been for generations a mysterious country, and it had been so especially between the years 1810 and 1840. Like the realm of Prester John, almost anything might then be told of it without fear of contradiction. Very dark stories *were* related, in fact, but few persons came out thence, at that time, to testify whether those stories were true or not. As for Paraguay, she neither denied nor asserted anything; she had a sublime indifference to all foreigners and their opinions, and she took good care that domestic opinions did not run riot.

The country known as Paraguay is named from its principal river, which rises in the Matto-Grosso of Brazil, near the sources of the Amazon, and rolls its grand flood for near two thousand miles before it reaches the South Atlantic. The name is now confined to a tract about five hundred miles long and two hundred wide (between 19° and 28° S., and 54° and 59° W.); but the whole immense country east of the Andes and south of Brazil was originally called Paraguay by the Spaniards. Paraguay has moderate mountains and great plains, a vast extent of jungle and swamp, forests full of rare woods, and a planta-

tion country of great fertility. The country lies partly within the tropics and partly within the temperate zone, and almost everything which is good for man seems capable of cultivation in some part of her domain.

The Fauna and Flora of Northern Paraguay resemble those of Brazil, while in the south they are Argentine, even approaching Patagonian. Within her limits are found all the animals of the two zones, from the jaguar and cougar, the bear, tapir, and deer, to the cassowary and the American ostrich, beside an immense variety of other birds, mostly of curious and gorgeous plumage. A great variety of rattlesnakes, boas, and other serpents abound, and vampire bats and many noxious insects are also common, while certain portions of the country are quite free from all of them. Horses, horned cattle, and sheep are plentiful; the two first thriving exceedingly well, the last moderately. The aboriginal Guaranis of Paraguay have been crossed with the Spanish and negro races,—the latter introduced as slaves by the Spaniards. The mixture of white and Indian blood has produced not a bad race, which forms the mass of the population, there not being near so many negroes or mulattoes now in Paraguay as there were at the close of the last century. The prevailing mixed race is very fertile; and but for unprecedented oppression and tyranny, and wholesale destruction in war, to an extent unparalleled elsewhere, the population would now be very dense. Man for man, this mixed race is not so strong as the North American or the European, but they are supple, active, and very apt for arms, while their ability to stand prolonged operations and their splendid courage under fire have excited the admiration of the whole world. These people require but little in the way of food, and will stand short rations a long time if they have their tobacco and maté. In color they are dark brown, and they are seldom above the medium stature. Marrying early, they generally have a numerous progeny, as, indeed, do the few pure whites in the country.

The Paraguayan's dependence for subsistence is entirely upon his own soil. They grow excellent cotton, corn, mandioc, rice, beans, coffee, and fruits of many kinds; while their tobacco is preferred by many to that of the Habana; and they have sugar-cane, the suckers of which, if irrigated, remain useful for ten or twelve years. For three hundred years the women have woven and worn a mixed stuff of wool and cotton beautifully dyed. They have an abundance of excellent clay, from which bricks and tiles are made, and limestone and salt are plentiful within their borders. Moreover, in hardly any other part of the world is to be found such a variety of hard and beautiful woods, impervious to the attacks of ants, and almost proof against the tooth of time. The Ilex Paraguaiensis, or yerba maté, is an indigenous shrub, which furnishes the universal drink, besides being sought for by all

the inhabitants of the Argentine Confederation as well. This "yerba" has always been a government monopoly in Paraguay, and looked upon as the most certain source of revenue. It is packed in raw-hide bags, and fifty millions of pounds is not an unusual annual consumption. The tea is drunk from a small gourd, which is mounted in silver or pewter, by means of a tube called a *bombilla*, with a perforated bulb, which is used to prevent the particles of the leaf from coming into the mouth as the tea is sucked up. Paraguay tea is a most grateful and excellent stimulant, and almost indispensable to the natives. The people tan excellent leather with indigenous barks, and have many necessary industries well established. Indeed, it would be hard to find a more self-supporting population.

The splendid river which forms the western border of Paraguay is always navigable, while the Parana, on the other side, is so subject to violent fluctuations that its navigation is very uncertain; but this is of comparatively small importance, as the elder Lopez, many years ago, built a railroad which tapped the most productive part of the country, carrying to the capital, Assunçion, the yerba, hides, and other important articles of trade.

The discoverers who carried out the exploration of South America, from the Spanish Main down, must have had grand experiences. Besides the privilege of being the "first ever to burst into that silent sea," as they pressed south they saw in the Brazils such scenery and such vegetation as had never met their eyes before. Whether they were Iberians, Provençals, or Genoese, we know what a contrast that coast must have presented to their own sun-dried native shores.

Among them, Juan Dias de Solis discovered the great estuary of the Plata in 1516, and sailed up it until he came to an island where great rivers emptied. Here he found an Indian town, the inhabitants of which he chose to consider gentle savages, and, landing among them, with threescore and ten of his men, was straightway set upon, killed, roasted, and eaten in the very sight of the Spaniards who remained on board ship, and who were powerless to offer any assistance. In fact, they were so dismayed by this reception that they sailed out of the river again, and never furled sails or let an anchor go until they were safe in old Spain. Some authorities state that this incident occurred on the island of Martin Garcia, but most of them place it upon the mainland, near Colonia.

It was at least ten years before the Spaniards came back, this time under Sebastian Cabot. He passed above Martin Garcia, and entered the Parana, getting some idea of the hugeness of his discovery.

By 1536 the great river had been explored, and a fort was built at Assunçion by Juan de Ayola, just opposite to where the Pilcomayo comes into the Paraguay from the Gran Chaco. This site, well chosen, has ever since been the capital of Paraguay, and has been the scene of

some of the most curious passages of modern history. While prosecuting his observations and conquests among the wild tribes of the interior, Ayola fell a victim to their treachery and ferocity. Cabéça de Vaca and Irala succeeded him,—two leaders whose exploits and marches occupy a large space in the pages of the chroniclers. After these appeared the real tamer of the native tribes, and the real founder of the state of Paraguay, in the person of Pédro de la Gasca, who succeeded in joining hands across the Cordillera with his countrymen in Peru. Close upon his time came the founding of the "missions," the Spanish Jesuits establishing a sort of theocratic-communistic government, so to speak, which would have been almost impossible with any other people, or in a country less remote from the busy world. The condition of things produced by their rule was the forerunner of the curious government which we shall see was later exercised by Dr. Francia and the Lopezes, father and son.

On gaining control the Jesuits closed the country to all strangers, and among the natives, their willing serfs, lived a life stranger than that found in almost any other history of human effort, so curiously was intense bigotry, pride of place, and self-indulgence mingled, in their case, with philanthropy and, sometimes, self-denial approaching self-abnegation. Up to a certain point the Mission Jesuits had great success, bringing under strict rule, and rendering industrious and self-supporting, a population not by nature intended for hard work or implicit obedience. Much as the "society" made them then the Paraguayans remain to our day.

After sixty years of labor in developing a most curious state of society the Jesuits were suddenly expelled from the country, as they have often been in other regions, apparently just in the fruition of their hopes and efforts. Their mission often seems to have been to prepare and plant the soil that others may harvest.

After the expulsion of the Jesuits Paraguay became for a time simply one of the provinces under the Spanish crown, but was saved by its remoteness from participation in many of their vicissitudes and distresses. In the days before steam the steady and powerful current of the great river rendered approach from the outside world tedious and uncertain, and, as a consequence, Paraguay was left very much to herself.

When the Spanish monarchy fell, before the arms and artifices of Napoleon, great upheavals followed in all Spanish America, the ground-swell caused by which continues to surge, and sometimes to break, in those lands. So far as Paraguay was concerned, there was, during these troublous times, some fighting, but much more negotiation; and the agitation ended in the establishment of the complete independence of that country, the business having been principally managed by that remarkable man, Dr. Francia.

A congress was then summoned, and a consular government formed, consisting of Francia, Yégros, and two or three others. Most of these not being men of ability or force, matters soon became involved, and Francia withdrew from the Junta, in order that they might realize how much they needed his clear head and business habits. He was not long absent, for, being implored to return to office, he did so, and soon after suppressed his colleagues entirely. Some time afterwards he caused Yégros (the only one of any prominence at all) to be shot upon a charge of conspiracy. In 1814, Francia caused himself to be made sole dictator for five years, the reason urged being the necessity for a strong government during the crisis through which the Hispano-American colonies were passing. They certainly got a strong government in Paraguay, the people little knowing what a King Stork they had called to rule over them.

In 1816, by perfectly simple means for one in his position, he was permitted by an ignorant and subservient congress to nominate himself perpetual dictator, when he at once commenced to terrorize the country by laying snares for, and arraigning all whom he imagined were, or might be, his enemies. It is probable that the greater number of these were entirely innocent of any design against him.

Being now clothed with absolute power,—and wielding that power with a merciless hand,—he decreed the absolute isolation of the country; permitting the people no relations whatever with the outside world. If persons succeeded in introducing themselves, from any motive, within Paraguayan borders, they were indefinitely detained. No native was ever suffered to leave the country at all,—and there were very few exceptions in the cases of foreigners, and these only after long detention.

Robertson was, perhaps, the only person who departed with Francia's entire approbation, for the reason that the dictator hoped to profit by his services as an agent in England; but the canny young Scot forgot to come back again.

Reugger and Longchamps, the Swiss surgeons, were allowed, grudgingly, to escape, and a very few English and Argentines were rescued by diplomatic equivocation on the part of Sir Woodbine Parish, the British minister at Buenos Ayres.

Bonpland, the eminent and benevolent French naturalist, the former companion of Humboldt, fell under Francia's displeasure because he had planted a nursery of yerba-trees in Corrientes, usefully employing many idle hands, but thus interfering with a Paraguayan monopoly. He was seized by a band dispatched for the purpose, and summarily hurried over to Paraguay, where he was brutally treated, and detained for no less than nine years, in spite of the efforts of his friends and repeated diplomatic representations on the part of the French and English governments. Just as Bonpland had succeeded in establishing a plantation in Paraguay and was beginning the world again, the

tyrant changed his mind, and poor Bonpland was, without the slightest warning, set across the river in a canoe, and left, penniless, to shift for himself once more. He never left South America, and died about twenty years ago, at a great age, in Entre Rios.

Dr. Francia was the son of a Brazilian named França, who had been brought to Paraguay many years before, to manage the tobacco-factories and plantations,—always an important industry in that country, where even the women and children smoke. His son, the future dictator, was originally intended for the Church, and was educated at the University of Cordova, then the great school of all Spanish South America. But instead of receiving the tonsure he became a professor of the limited learning of that age and place, and, later, an advocate of the courts.

But, to return to his administration of the affairs of Paraguay. As has been said, on obtaining supreme power he quickly concentrated within his own hands all the functions of the state, and formed an army—which constituted his body-guard, police, and executioners—entirely from the half-breed population and the Indians, with whom he rendered himself popular by decreeing the civil death of all Spaniards. For twenty-seven years he successfully carried out his system of terrorism and isolation, being finally carried off at a ripe old age, by apoplexy, as is supposed.

His own orders prevented any assistance from reaching him in his last moments, as no one dared to address him, much less to enter his apartment, without express orders, the penalty being death.

This strange being assumed the title of "El Suprémo," and was thus spoken of by all Paraguayans for a generation; and such was the terror of his name that for years after his death he was always referred to, with bated breath, as "El Difunto."

Francia repeatedly received overtures for alliance with the Argentine Confederation and requests to send delegates to their congress, which he treated with silent contempt, and, on the contrary, devoted himself to the complete sequestration of his country,—to perfecting what was perhaps the most absolute and curiously perfect tyranny the world has ever seen, and to so carrying out, in all its possibilities, the system of society devised by the Jesuits, that he became thoroughly independent of all the outside world. The climate rendered little necessary to sustain life, and necessaries, and even luxuries, grew generously in response to the slightest amount of labor. There was no public revenue or budget, as we understand such things. Francia used the public money as he saw fit, and there were none to call him to account; the previous training of the population and the exceptional geographical position of the country rendered his course comparatively easy.

Space is needed even to hint at his far-reaching and cold-blooded tyranny, or to tell of the thousands whom he executed,—often after

prolonged imprisonment and torture. He most frequently served out, with his own hands, the three ball-cartridges, which were all he allowed for an execution, and then saw the sentence carried out from his window, —the bayonet being frequently employed to finish what the ball-cartridges did not accomplish.

The best people in the country—many of them former friends of the dictator—were kept in prison and in irons, generally under charges of conspiracy, until death released them, or until some attempt at intercession recalled their existence to Francia, when they were brought out and shot, the intercessor being pretty sure to suffer the same punishment.

Francia expected by this course to preserve his rule and to prevent the introduction of liberal ideas. He certainly succeeded; but there is no doubt that most of his executions were the result of private malice or insane suspicion. The story is told of him that he kept in prison a formerly successful rival in the affections of a fair Paraguayan for exactly the number of years and months that the rival had enjoyed his success, and then had him brought out and shot. In his early life he is said to have been given to almost every vice, but when he came to power he completely abandoned these. Cool, crafty, suspicious, and cruel, he still showed a degree of personal vanity which led him to do many ridiculous things, at which no one, however, dared to smile.

By his spies and agents he interfered in every concern of life, even the most trivial, and was known to shoot or hang mechanics who were unskillful in their trades,—"*pour encourager les autres*,"—thus insuring the very best exertions of those whom he employed. The discipline of his army was, for his purposes, perfect, for he made them so feared and hated that their only hope and safety was in the favor of their master. The cultivation of the land was often carried on by the léva or corvée,—to the profit of the state, himself, and his army, which was well clothed, armed, and paid.

To obtain from foreign countries those things which were considered absolutely indispensable, such as gold lace, epaulettes, muskets, and jewelry, fine wines, letter-paper, etc., he had a depot at Itapua, on the Parana, opposite the Brazilian frontier, where exchanges of yerba and hides were carried on under his own regulations. He fixed the prices, and afterwards retailed the European goods, by his agents, from shops which were guarded by his soldiers, who saw that no one got any more than "El Suprémo" thought he ought to have and gave him a permit for.

The fear of assassination at last (very naturally) became the controlling idea with Francia, and caused him to be continually adding to his list of persons for execution. When death at last put an end to his atrocities this list was found, with the names of many inoffensive people quite recently added to it.

He was served by two or three black slave women, and by his secretary and barber, a half-breed, named Patiños, who was the Olivier le Dain to this other Louis XI. Ignoring his family, and refusing, with brutal words, to visit his father upon his death-bed, he made one exception in regard to a sister, who was allowed to make his cigars for him; and even these he is said to have unrolled, for fear of poison. It was never known in which of several houses he would sleep, and he never went out without arms and wearing some armor under his clothing. A strong escort accompanied him in his afternoon rides, the cathedral bell always being rung before he set out, so that every one might go within and close their houses. If, unluckily, any one was belated, he was obliged to throw himself upon the ground until "El Suprémo" passed. Such was the wretched life this man led, and seems to have enjoyed. He is said to have had a high opinion of everything French, and to have especially admired Robespierre and Napoleon. Modeled upon the literature of the eighteenth century, in which he was tolerably well read, his own writing was stilted and pedantic. There are really no records of his long reign. He died intestate, and left comparatively little property, and no written directions of any kind. Even his autograph is said not to be common. The written instructions to his police were few, and were returned to him indorsed with their execution, and then destroyed. When he died at last, he left merely a name which was a bogey to scare the masses with for many a long year; and the more ignorant looked for him to reappear, esteeming the report of his death as one of his deep-laid schemes to entrap his enemies and the unwary. Carlyle, in his essay upon Francia, with that wrong-headedness which is a characteristic of the grim philosopher of Chelsea, praises Francia highly; but all that Carlyle could know about him at the time he wrote was derived from Reugger and Longchamps, and the Robertsons, and they are very far from giving any pleasant traits of him.

The Paraguayans, after his training, and that of the Jesuits, could not do without a master. After his death one Medina seized the government; but, the troops not favoring him, his tenure was short. Then a congress was held, which, in 1841, decreed a consular government, Carlos Antonio Lopez, a nephew of Francia, and Don Mariano Alonzo being made consuls for three years.

Don Mariano was not a very able man, and when the three years expired he was quietly relegated to obscurity, and Lopez became sole ruler, with the title of Permanent President. He was of very different physical and moral type from Francia, and had some human sympathy in his composition; but he was more ignorant, and, in his way, quite as jealous of his power as ever El Suprémo had been.

He conciliated the Indians by making them citizens; and aware of the ridicule, as well as the element of danger due to the complete

isolation of the country by Francia, he proceeded to open the way for commerce. The great river has been open ever since, except during blockades. This action of his brought on hostilities with Rosas, then in supreme power at Buenos Ayres, who not only claimed for the lower provinces the exclusive navigation of the Parana, from junction down, but also demanded the submission of Paraguay herself. Lopez's refusal of these demands brought on a war, which was inconclusive.

In 1855, Lopez made treaties of commerce with the plenipotentiaries of England, France, Sardinia, and the United States, the negotiations being at Assunçion, and foreign vessels for the first time arrived at that city for purposes of trade. During the previous year he had gone through the form of a re-election for ten years, and had made extensive preparations for reorganizing his army, and for importing material for an arsenal, foundries, and a dock-yard, with skilled labor for operating them. All these works were fairly under way when, in 1862, Lopez died, having previously exercised the right, which he had caused to be conferred upon him, of nominating a successor, who was his son, Francisco Solano Lopez, the person whose bloody and desperate struggle with Brazil, and whose deservedly miserable death at the hands of the Brazilians, are matters of quite recent history.

With the younger Lopez we have nothing to do, and for our purposes this slight sketch of Paraguayan history may cease with his father's time.

The United States government had, in the year 1853, sent a small expedition, in the steamer "Water-Witch," under the command of Lieutenant Page, to survey and explore the Plata and its tributaries. Page had been well received by the authorities of all the different states, and Lopez, especially, seemed to enter with great heartiness into the undertaking.

The American expedition was by no means idle, and added very much to our knowledge of all these countries and their resources and wants. The charts which they made of the rivers which watered them were most important, one of the first discoveries being a new channel at the junction of the Parana and Uruguay, which entirely did away with the importance of Martin Garcia as a military station, which island, commanding the only previously known entrance of the great rivers, had always been prominent in all treaty stipulations.

Page, moreover, demonstrated that by the course of these river-channels a vessel of nine feet draught could penetrate nearly two thousand miles into the heart of the continent, and bring down the productions of a very rich country without transhipment.

The work of the survey went on very well in every respect until February, 1855, when the "Water-Witch" was fired upon by the Paraguayan fort of Itapirú while in the neutral waters of the Parana. A quartermaster was killed on the spot, and Lieutenant Jeffers, who

was in temporary command, promptly returned the fire; but, the point of honor having been sustained, and knowing the lightly-armed vessel to be unable to cope with the fort, he withdrew, and reported to Page, who hastened to Montevideo to lay the matter before Commodore Salter, who then commanded our squadron on the coast of South America.

And now let us see how this state of hostilities came about.

Lopez had been seriously offended by Page's ascent of the river into Brazilian territory, saying that it was impossible for him to discriminate between a scientific expedition and any other, and that the Brazilians would now insist upon the same privileges as the Americans. After a time, however, the President appeared to be appeased, and the usual relations were resumed; but it seems that the offense was not really forgiven by the arrogant and ignorant dictator.

The real key to the Paraguayan difficulty, however, is to be found in the relations of E. A. Hopkins and Lopez,—the irritation caused by an open quarrel between them reacting upon the surveying expedition, and culminating in the attack upon the "Water-Witch."

Hopkins was an American, originally a midshipman in our navy, from which he resigned, and, while still a very young man, had become interested in projects connected with the opening of Paraguay to commerce. He had been sent, in 1845, as a special agent or commissioner from the United States to congratulate the state of Paraguay upon having adopted a republican form of government after the long dictatorship. This seems to have been rather a premature proceeding on our part in the light of subsequent events, but was at least well meant. Hopkins exceeded his instructions, and offered the mediation of our government in the war then going on between Buenos Ayres and Paraguay; and as soon as he learned of this the President of the United States revoked Hopkins's appointment. Hopkins was a fine-looking man, of adventurous and sanguine temperament, fluent in speech, and in the full flush of health and strength, and he so favorably impressed Lopez that the latter gave him every promise of assistance in his projects.

Hopkins returned to the United States, and there interested some capitalists, principally of Rhode Island, in his schemes, and returned to Paraguay, in 1853, as manager of the "United States and Paraguay Navigation Company," and also holding a commission as United States consul at Assunçion. A steamer called "El Paraguay" was dispatched by the company, loaded with boilers, agricultural implements, and other articles, but she was disabled on the voyage, and obliged to put into Maranham in distress, where she was sold, as well as her cargo. Other consignments were, however, sent out, land was purchased, saw-mills erected for cutting the valuable woods of the country, and cigar-factories started under Cuban foremen. But after a time Lopez seems to have

discovered that the principal profits would enure to the company, and not to himself, as was the custom in Paraguay, so he began to grow cool towards his new friends.

Hopkins, in his double capacity, carried a high hand, and was not so conciliating as he should have been if he intended to succeed in his enterprise, for Lopez was absolute in his own country.

Open discord broke out between them at last, on account of an assault made by a soldier upon Hopkins's brother, who was riding out with a foreign lady, and who dispersed a drove of cattle which were being driven by the soldier. No soldier or citizen of Paraguay would have dared to make an assault of the kind unless it was pretty well understood that the Americans were out of favor. In most countries the case would have been settled in a police court, but in that land the President was police judge as well as everything else, and he took exception to the language in which the complaint against his soldier was couched. Our consul espoused his brother's cause with great fervor, and there was bluster on both sides, a personal squabble, and a paper war. Hopkins's exequatur was revoked by the angry Lopez, who had only been waiting for an excuse to do so, and he then at once began to obstruct the operations of the American company,—preventing, by edict, the natives from working for them, and so harassing them that they were compelled to stop all work.

Hopkins was powerless against supreme and irresponsible power, and finally decided to leave the country, with his assistants and all portable property. But as soon as it became known that he was personally obnoxious to Lopez, no trading vessel would take them or their effects, for fear of sharing in the interdiction of the American company. Hopkins naturally appealed to Page, who understood Lopez by this time, but could do nothing with him; and so, after a good deal of minor diplomacy, which had no result except to renew and develop the ill feeling on both sides, the American naval commander determined to take his countrymen away in the "Water-Witch."

Lopez was by this time worked up into a perfect fury, and just then, as luck would have it, the bearer of the treaty of commerce with the United States arrived, that document now only wanting Lopez's signature to complete it. Lopez flatly declined to ratify the treaty, or even to receive the commissioner, and things were very unpleasant in all respects.

In spite of threats and of the warlike appearance of Lopez's navy of four or five brigs and schooners, the "Water-Witch" proceeded unmolested down the river, with her passengers and their effects, and Page thought himself clear of further complications. But Lopez had by no means done with him, and very soon after occurred the firing upon the "Water-Witch" from the fort Itapirú, which has already been described.

It is possible that if Commodore Salter had had a vessel fit for the purpose ready to dispatch forthwith to Itapirú, Lopez would have come to terms at once. But the commodore had no such vessel, and so referred the matter to the authorities at home.

President Buchanan, in his first message, reviews all these transactions, and recommends to Congress a demand for satisfaction, in a firm but conciliatory spirit, and goes on to say that "this will more probably be granted if the Executive should have authority to use other means in the event of refusal."

In June, 1858, a joint resolution authorized the President "to adopt such measures as in his judgment may be necessary and advisable for the purpose of adjusting the differences between the United States and the Republic of Paraguay, in connection with the attack upon the U. S. S. 'Water-Witch,' and with other measures referred to."

A commissioner—Mr. Bowlin, of Missouri—was appointed to carry on negotiations. He had full powers to settle the difficulty amicably, if possible, and was to obtain satisfaction for the grievances of the American citizens who had been forcibly despoiled of their property and had their business broken up. A naval force was to accompany him, but only to be employed as a last alternative.

Those who knew anything of Lopez, and of Paraguay, did not doubt a stubborn resistance to our demands.

The United States men-of-war then upon the Brazil station were the "St. Lawrence," a sailing frigate of fifty guns; the sloop "Falmouth," twenty; and the "Dolphin," "Bainbridge," and "Perry," of from four to six guns each,—all sailing vessels. In addition to these there were sent out the frigate "Sabine," fifty; the sloop "Preble," sixteen; the "Supply" and "Release," store-ships; and the steamers "Fulton," "Water-Witch," and "Harriet Lane," all three paddle-steamers of light draught, the latter being lent by the Treasury Department. In addition to these naval vessels, there were chartered for the expedition seven steamers which had been engaged in carrying coal and grain in the coasting trade, and which were hastily converted into armed vessels, carrying two 9-inch guns each. The frigates and sloops were not, of course, intended to attempt the ascent of the river, but were to send launches with howitzers. The *personnel* of the whole squadron did not, probably, exceed two thousand five hundred; and perhaps eighteen hundred, including the drafts from the large vessels, actually ascended the river.

Commodore W. B. Shubrick, with Commander Page as fleet-captain, and Commander Percival Drayton as aid to the flag-officer, went out in the frigate "Sabine" to command the expedition. The "Sabine" also carried Commissioner Bowlin, who was instructed to insist upon an indemnity of at least five hundred thousand dollars, or a submission of the claim to arbitration. He was to ascend the river to Assunçion,

and put himself in communication with Lopez for that purpose, leaving most of the naval force at some convenient point below.

About this period of the operations comes into prominence General Urquiza, of Entre Rios, one of the most influential of the military men who have shaped the later history of the states of the Plata.

José Justo de Urquiza was born in Entre Rios in the year 1800, and rose by sheer force of character from an ordinary "estanciéro" to be chief of the state. During the struggle between the "Federales" and "Unitarios" he at first sided with Rosas, but after a time declared against him, and finally totally defeated him at Santos Lugares, Rosas soon after flying from the country, and taking refuge in England. Urquiza then succeeded to the government of the whole of the Argentine provinces except Buenos Ayres. He led the life of a feudal baron on his vast estates in Entre Rios, but evinced enlightenment by establishing institutions of learning, and especially a college for the youth of the country, and by favoring the development of the natural resources and the commerce of the country, as well as the navigation of the rivers.

But at times he still showed that he was a Guacho, as a single anecdote of him will prove. In one of his campaigns he captured a hated and dangerous enemy, and carried him about captive for many months, causing him every night to be chained to a lance in his own bivouac. This was worthy of an ancient Scythian.

In 1861, Urquiza was named general-in-chief of the Argentine Confederation, when he at once declared war against Buenos Ayres, but was handsomely whipped by General Mitré, who, however, allowed him to retire once more to Entre Rios as governor. To finish the account of him, we may say that in 1868 he was a candidate for the presidency against Sarmiento, but was defeated by the latter; and two years later he was assassinated by General Jordan in one of the everlasting political broils which have been the curse of that country.

This General Urquiza was much disquieted by the idea that the United States should send a force into the interior of the country, feeling sure that a collision with Paraguay would, sooner or later, create such changes that the old order of things, especially comfortable dictatorships, would be done away with. As soon, therefore, as the expedition arrived at Montevideo he set himself to work, by means of his agents, to discover just what the American commissioner's instructions were. Easily succeeding in this,—for our rural diplomat was no match for him,—he at once hastened up the river to Lopez, and counseled him in the most emphatic terms to avoid collision, and to accept arbitration. Lopez had great respect for Urquiza's judgment, and rather sulkily consented to be governed by his advice. Lopez had then some works at Humaïtá, the place afterwards so celebrated as a stronghold, and there were some batteries at and below Assunçion. Reports and

opinions differed, however, as to the strength of these works. Many people suppose that we would have come to grief if hostilities had actually commenced. Considering what the Paraguayans afterwards accomplished against the allied fleets and armies, and considering the character of the vessels of which our force was composed, it is altogether probable that we would have had a warm reception, and probably have suffered serious loss. "*Quien sabe?*" The commissioner and the flag-officer, accompanied by Urquiza, went up to Assunçion in the "Fulton," and, after some parley, came to terms. Lopez demurred to the amount of compensation demanded, and it was finally agreed that commissioners from each side should meet in Washington as soon as possible to settle the amount. Apologies were then made for the attack upon the "Water-Witch," and the cloud of war was dissipated.

Urquiza was so delighted with this peaceful solution of the difficulty that he presented Commissioner Bowlin with a splendid diamond snuff-box and Commodore Shubrick with a sword, and afterwards entertained them handsomely at his grand residence, San José, in Entre Rios. Our Congress did not act upon the convention agreed upon at Assunçion until May, 1860. Señor Don José Berges, the Paraguayan commissioner, had then been waiting at Washington for some time, and finally Mr. Cave Johnson was appointed to meet him on the part of the United States. In spite of the fact that they were brought together for the sole purpose of determining the *amount* of compensation due by Paraguay, these gentlemen reopened the whole question, reargued it, and finally decided that Paraguay was not legally responsible for any damages in the matter of the American company. Mr. Buchanan was, naturally, much displeased at this result of their deliberations, and sent a message to Congress, in which he stated that the commissioners had decided a question which had not been referred to them. By this time the midsummer of 1860 had come round, with all its excitements and anxieties, and by the time Congress met again our domestic difficulties engrossed the thoughts of every one, and in a few months the dreadful civil war blotted out from the memory of most people the comparatively insignificant Paraguay expedition and its barren termination.

The vessels composing that expedition had been sent an immense distance, at a very great expense and risk, into the far interior of a remote country, an apology had been extracted from Lopez, and our honor thus vindicated, but no material reparation was ever made by him.

Such—throwing out minor details—is believed to be a fair résumé of the facts connected with the Paraguay Expedition of 1858–59. The vessels which composed the expedition have already been mentioned.

The appearance of the chartered ones did not fail to excite the smiles of foreign naval men, and to give rise to grave apprehensions

for the result, in case of fighting, in the minds of our more thoughtful officers. Yet their ships' companies went out in them for a long voyage, and a prospect of battle on arrival, with the same cheerful and unquestioning obedience and confidence which, two or three years later, carried our navy through the winter blockade in an improvised fleet.

Of the chartered steamers, four or five were familiarly known in the expedition as "Cromwellians," or "Parker Veiners,"—the first derived from the owners, then well known in the coastwise trade, and the latter from the name of a certain kind of coal which they carried. The sole merit of these vessels consisted in their light draught of water. They were screw-propellers—queer, ungainly craft—of the kind of model which is said to be built by the mile, and sawed off in lengths to suit purchasers. Their very light upper decks were occupied by a very long range of deck-houses, beginning with a pilot-house away forward, from whence they were steered, like a river steamboat, by long rods and chains, which often got "jammed in a sheave" at inconvenient times, and would have been a poor reliance in action. Above the deck-houses projected a single smoke-stack and schooner's masts, spreading very little canvas; indeed, their sailing power was nearly nil. Their engines and boilers required tender care and a deal of tinkering, as well as stops at all hours to "screw up." These vessels were wall-sided and high out of water, from having been built upon to increase their capacity, their top sides being of inch plank, through the seams and crevices of which one was able to get glimpses of the outer world, as he lay in his bunk, and through which driving rain or spray not unfrequently penetrated to awaken the sleeper. The engines and boilers entirely cut off all communication between the forward and after parts below decks. The gun-deck, forward of the engines, had two large ports cut on each side, so that the two 9-inch guns could be fought together in battery. These pieces of ordnance each vessel carried out and brought home again in her hold, the carriages being secured amidships. With the weather we were favored with the ports were generally kept open, rendering the "gun-deck" the pleasantest part of the vessel.

About the time this improvised squadron was ready for sea the writer was broken out from shore duty by a peremptory order to one of the "Cromwellians," and in less than forty-eight hours afterwards was steaming out past Sandy Hook "on the war-path." The vessel to which he was attached had, with a twin sister, been detailed for the incidental duty, so to speak, of conveying to Venezuela General Paez and his suite, and, after restoring them to their native soil, were to make the best of their way to the River of Plate.

General Paez's name had been for many years associated with the civil wars, the politics, and the progress of Venezuela, but more than

once the star of his enemies had been in the ascendant, and he had suffered both imprisonment and exile. When driven from the country the last time he had taken up his residence in New York, and he had just then been recalled by a "revolution" in his favor.

Our government, for various reasons, favored his restoration to power, and sought to do him honor and evince good will by offering passage in a government vessel for him and all his followers. Perhaps better vessels might have been selected, but the flag was the main thing, and the Venezuelans are, as a rule, better judges of horses and cattle than they are of ships.

Table furniture, provisions, and wine in abundance had been placed on board for the use of the party. Our commander gave up his cabin to the passengers, and all became members of the ward-room mess.

There were a good many of these people, and the ward-room, as well as the cabin, was full of cots. The officers of the ship slept in bunks, in two tiers, with curtains, their apartment being a square box or pen of nearly the depth of the vessel; in fact, it had been the grain-bin of the ship when she was in the coasting trade. Sometimes, when she was employed as a collier, it had held coal.

Among our passengers were two sons of General Paez, middle-aged men. There were some military men whose fortunes were linked with that of the general, but the status of most of the passengers we never could discover. Included among the list of followers were two New York "Bowery girls," going out, ostensibly, to teach the Venezuelans how to work the sewing-machine.

As is often the case in early December, we had fine weather for leaving our coast, and a fair run down to the Virgin Passage, but our passengers succumbed when we passed the light-ship, and most of them never emerged until we entered the harbor of St. Thomas. Some of them had set squadrons in the field, broken wild horses, and lassoed the untamed bull of the llaños, but that availed them nothing against the waters of the Gulf Stream and the eccentric motions of the craft which carried them and their fortunes.

I really think that putting in to St. Thomas saved some lives; for some of these people never took a morsel of food during the passage, and their appearance was, by the time we arrived in port, neither prepossessing nor warlike. Some of the very dark ones were of a bronze green which was frightful. From the category must be excepted Don Ramon Paez, an old traveler and a good sailor, as well as an accomplished artist and author.

As all these people were our messmates, and as the good things provided were perishable, we were obliged to do extra duty in consuming them, and I never remember a jollier passage,—it was a perpetual picnic, in fact.

After two or three days of patching and tinkering at our engines

we sailed from St. Thomas for Cumana, but broke down when little more than half-way across the Caribbean Sea, with some difficulty fetching in, under sail, under the lee of a barren, sandy, deserted key, —near Tortugas,—a place which is, at certain seasons, frequented by turtle-catchers. Thence, after more tinkering and patching, we sailed again for Cumana, in Eastern Venezuela. Cumana is the oldest city in all Spanish America, but has been so knocked about by earthquakes and has so lost its trade that it is of little importance now. Paez's strength, however, lay in the east and in the interior, and so he desired to land here.

We arrived at Cumana on a lovely moonlight night, dropping our anchor among the quaint stone parapets and sentry-boxes of an old Spanish fort, long ago submerged by an earthquake. Daylight showed us these, down, fathoms deep, under the clear, still water, and of course we soon shifted our berth. The Manzanares here empties into the Gulf of Cariaco, which sheet of water has anchorage for the navies of the world, while the river is a typical tropical stream, with great wealth of vegetation on its banks, and plenty of alligators in its waters. The people very sensibly build their houses of one story, on account of frequent earthquakes. We saw a large crack or crevice opened by a recent one in the main plaza, over which bridges of plank were laid.

As soon as we could do so we withdrew from the demonstrations and jollifications which ensued upon the general's arrival, anxious to pursue our more important duty, which was to get to the River of Plate as soon as possible.

Steaming up against the Trade wind and a strong current, we crossed the "Dragon's Mouth" of the Gulf of Paria, and then steered away N.E. for Barbados, where we were to coal.

Barbados is not a very exciting place,—one must be sure to pronounce the ultimate syllable *dos*, to avoid correction by the residents, —but the 'Badian negroes are amusing, and are celebrated for their "cheek" and their ridiculous pompous language. They were, long ago, immortalized by Marryatt, and it is safe to say that his description of a "Dignity Ball" would, in most respects, hold good to-day.

Great excitement was caused during our stay there by the arrival of the "Metacomet," another one of the expedition. She was a regular American river steamer, of no great tonnage, principally consisting of paddle-boxes, walking-beam, hurricane-deck, and general top hamper. She was a most unfit vessel for such a voyage, and yet she successfully accomplished it. The 'Badian boatmen and water-side people, never having seen such a craft before, were lost in wonder, and a belief obtained among some of them that she was a floating cane-mill, while others fancied she contained some sort of show. This vessel, with her name changed to "Pulaski," remained in the River Plate for several years as a man-of-war, under our flag, and was then

sold. Having tinkered and patched and received coal, we made a long stretch on our way south, round Cape St. Roque to Pernambuco. Here we went inside the curious reef which forms the natural breakwater, and repeated operations as at Barbados.

While we were there another of the vessels of the expedition came in. This was the "M. W. Chapin," which craft, previous to being chartered and converted into a "man-of-war," had filled the useful office of a canal-boat. She had a sort of coffee-mill arrangement in her stern called a steam-engine, and two small propellers splashed about the water under her "overhang." From Ceara down to Cape St. Roque she had been able to navigate the shoal channels between the outer reefs and the coast, thus escaping troublesome currents and some sea. This vessel also got out to the river without being lost, and, in her own good time, got safely home again. I believe government did not buy this noble craft, although the other chartered vessels were ultimately purchased, the charter-money going as part payment. The people in Pernambuco had never seen anything like the "Chapin" before, and divers were the speculations and questions about her. I believe most persons thought her some kind of anchor-hoy or steam-derrick, while others, looking at the erections upon her deck, opined that she was some new kind of mud-digger. We wisely held our peace, and allowed them to think her anything but what she really was, an American man-of-war, with a 9-inch gun and its carriage stowed away in her hold.

From Pernambuco we had another long stretch, with generally fine weather, to Montevideo, where we found most of the vessels already congregated; and very soon after (the "M. W. Chapin" having happily arrived) the expedition was considered ready for the ascent of the river. The sailing vessels sent us parties with launch and howitzer, each under the command of a lieutenant, and there were plenty of volunteers for this service. A pilot was engaged for each vessel, a proceeding apparently purely formal, and entirely superfluous, judging from the one assigned to the writer's ship, for, while in the river, we always anchored at night, and in the daytime ran by common sense, hugging the bank where the bluffs were, and avoiding the low, projecting points and sand-spits.

Our vessel carried the ordnance-officer of the expedition, who had charge, among other things, of a number of torpedoes, batteries, and coils of wire. I suppose these instruments and appliances were intended to destroy obstructions (a thing which was but little attempted by the Paraguayans in their late desperate war). The apparatus never emerged from the store-room, however; but had it been brought forth for use, I fancy that, in the then state of our knowledge and practice, it would probably have created havoc among the operators.

The ordnance-officer had, however, one unfailing source of amuse-

ment in his charge, and that was a large lot of patent rifles and carbines, sent by different inventors. They had been placed on board, with plenty of ammunition, for trial; the patentees desiring that they should be fired as often as possible, and only requesting that an account should be kept of the number of discharges and the condition of the piece.

So it was that, on these long, sleepy days, while struggling up against the current of the river, our after-deck (the "quarter-deck" was really forward) was the scene of a constant popping at everything which had life and motion, or at conspicuous trees or marks upon the shore. I must say that we were not usually very successful shots. Occasionally some one would hit a black-necked goose, flocks of which we sometimes found swimming in quiet reaches; and uncommonly lean and tough, and fishy and stringy we found them when brought to table. Occasionally some shag, or white cranes, and the great heron were come upon in the reaches, especially where the water covered miles of country, and the channel wound about, and we seemed to be the only occupants of the great river, bordered by bluffs on one side and great expanses of water-rushes, lilies, flags, and pampas grass on the other. Now and then, in very wild places, some "capinchos" were seen upon the banks; but their agility was marvelous, and they seemed to disappear as if by magic. Once a good shot among us succeeded in fairly hitting one of them, but in his last convulsive leap he fell into deep water, and sank like a stone. We went slowly, and during the first two or three days of the ascent our nightly suffering from the mosquitoes was terrible. We came to an anchor when it was too dark to run with safety, and our lamps were generally already lighted; but it took very few minutes for them to be extinguished after our way was stopped, on account of the myriads of these pests which offered themselves in holocaust and fell down the glass chimneys. They mocked at ordinary mosquito-bars, and preparation for one's bunk required a muffling of head, neck, and hands more appropriate to Arctic regions than to the climate in which we found ourselves. They were quite as bloodthirsty, though perhaps not so large, as those famous ones from Reedy Island, in Delaware Bay, which raised and carried off a schooner's deck, when the captain clinched their bills as they were digging through to attack him. After leaving the wooded alluvial banks of the lower river we scarcely suffered at all.

Passing Obligado, where the French and English cut the chain with which Rosas tried to close the river, in 1845, and San Nicholas, the prettiest part we saw, where the stream is several miles wide and the middle is the shallowest part, the channels lying on each shore, Rosario, the point at which all the vessels were to rendezvous, was at length reached. The river is here about a mile wide, and very deep, with a three-knot current. Only the "Fulton" and "Water-Witch"

were to go on thence to Assunçion, with the commissioner and Commodore Shubrick.

Rosario, a flourishing town on a bluff on the right bank of the river, is the terminus of a railway running to Cordova and beyond. Here we found vessels—mostly English and Italian—loading with cargoes of "carne séca," hides, hoofs, horns, and bones,—highly malodorous, and not nice lading with which to cross the tropics.

Across the river, in Entre Rios, Urquiza's escort was bivouacked on the low bank, the general being then in Paraguay with our people as mediator. These soldiers had few tents, most of them sleeping "al fresco," wrapped in their ponchos. Their only apparent duty consisted in herding their horses and the cattle which furnished their rations, a few men remaining always mounted for this purpose. They were capital campaigners, for their commissariat required no transportation, and they could live any length of time on fresh-killed beef and water; and if tobacco and a little maté, or new rum, was added, they were in clover. These Guacho soldiers were most picturesque and savage-looking fellows, with their swarthy faces, black locks, red caps and ponchos, and long lances.

While we lay at Rosario awaiting developments, tinkering and patching at boilers and engines went on as usual. But it soon came to be understood that negotiation would prevail, and that we should not have to try conclusions with the batteries at Humaïtá, but that the repairs done would be effected for the purpose of enabling us to hold out upon the passage home. We were in latitude 33°, in the middle of the southern summer, and the sun was very hot; but there was generally an air, and the climate was not at all enervating. We enjoyed fine shooting,—at partridges on the plains, and at snipe of several kinds on the low islands in the broad stream, which had been, but a few months before, completely submerged during the annual rise of the river. When the river falls, cattle are made to swim over to these islands, and, being half wild, are often dangerous to passengers on foot. Sometimes, too, a "tigre" is found there, brought down on floating islands, or "canalotes," during the spring flood, from the upper country; so that the island shooting was not devoid of a spice of danger, and rendering it necessary to carry a navy revolver as well as a shot-gun.

Visits to estancias and saladéros, or slaughtering establishments, and rides into the country filled up the time, until, at length, the "Big Wigs" came down-stream again, in high good humor and at peace with themselves and all the world. The result of their fore-gathering I have already given.

In a day or two we were all off down the river, the "lame ducks" among us finding it much easier work than the ascent. At length, after passing Martin Garcia, we snuffed the sea-breezes again, and, anchoring in Buenos Ayres Roads, or the "canal," pilots for

Montevideo were in demand. As ours had been of no use in the river, it was thought that he might know something about the great estuary. At any rate, he said he did, and so was put in charge for the passage. The first thing he did was to plump us upon the dangerous "Ortiz" bank, from which awkward predicament we were, however, able to extricate ourselves without damage, thanks to very fine weather and smart work, and in due time reached Montevideo. We made no long stay there, for charter-money was to be saved by sending us straight home. It was decided that the "Cromwellians" were to go home in pairs, so as to be able to assist each other in the not improbable event of a "smash up" of the machinery or other accident.

The writer's vessel, comparatively able, had to escort the lamest of the "lame ducks," which soon broke down, and had to be towed into St. Catherine's, entailing a delay of some days in that lovely harbor. From this time forth we never lost sight of her, day or night, regulating our motions entirely by hers, which was not difficult, for we had invariable fine weather and a summer sea. Having touched at Barbados again for coal, the month of June saw us once more safe in New York, having traversed some ten thousand miles of ocean and river without serious accident,—a remarkable achievement when we consider the material of which the chartered fleet was composed.

E. SHIPPEN.

2039 PINE STREET, PHILADELPHIA, November, 1879.

THE LEGITIMATE IN WARFARE.

[THE following paper was read, December 11, 1879, before the United States Military Service Institute, West Point, New York. We omit here the prefatory part, in which the author, after stating that he necessarily confines his discussion to that portion of the subject which relates to the weapons of warfare, and acknowledging a general obligation to Messrs. Orlando, Vattel, Grotius, Wheaton, Halleck, and Lieutenant-Commander Barnes, and a particular one to Admiral Dunsany, and to a discussion by the Royal United Service Institute of Great Britain, which took place two years ago, proceeds to show that "usage and precedent are the foundation of the laws of war," and that the profession of arms as the authorized manipulators of the terrible engines, offensive and defensive, which this epoch of scientific discovery is creating, owes it to itself to come to an understanding as to which of them shall be considered legitimate and which illegitimate in civilized warfare, placing the necessity of such decision on the threefold ground that we may thereby guide our own action in selecting or rejecting our weapons; that we may know when to outlaw the captured enemy who has used illegitimate means; and that when ourselves the captives, we may be able on sound grounds to claim in our own behalf the protection of the laws of war. As a means to an intelligent discussion of the subject, he proposes to make a short historical retrospect of the practice of the past, comparing it with that of the present, and noting to what extent the increase in scope and efficiency of destructive weapons has produced modification.

The reading of this paper gave rise to an animated discussion, which was continued at the next meeting of the Institute, where it was opened by an able and interesting review of this paper by the president, Major-General Schofield, U.S.A., Superintendent U.S.M.A. General Schofield's paper, it is expected, will appear in a future number of THE UNITED SERVICE.—EDS.]

In the earlier and more barbaric ages, when two nations engaged in war, it appears to have been the custom to destroy not only the armed forces of the enemy, but also as many non-combatants as possible, regardless of age, sex, or condition; in the invasion of a country, or the capture of a town, women, children, and old men were put to the sword with marked impartiality. This custom to a great extent arose from two causes,—the tribal organization of nations and the inferior social condition of women. The tribe was the family enlarged; the nation but a loose aggregation of nomadic tribes. The adult male members of the family were the warriors, and the women and children were their slaves. As such they did the work and bore with the drudgery of the camp in peace, and in war tended the flocks and raised and garnered the supplies. When their masters were defending their rudely-fortified towns or encampments they worked on the ramparts, or when

on the offensive assisted in the siege by their manual labor. Their destruction in a measure cut off the aggressive or defensive resources of the enemy, and also deprived them of their source for the supply of young warriors. Their death, therefore, followed as a necessary war measure. As this custom, however, in a generation or two began seriously to reduce the fighting forces on both sides, the rude statesmen of the day inaugurated the rule of capturing alive the women and young children, the former for breeding purposes, the latter for training as warriors on the side of the captors. The old men they continued to kill, probably as being in their opinion useless encumberers of the earth.

With the improvement in the organization of mankind, both political and social, and the partial emancipation of woman, came less rigorous rules as to their treatment by the enemy; and gradually with the lapse of time this clemency was extended to men not actually in arms. In the course of many centuries the list of recognized non-combatants became greatly enlarged, so that the dictum of the present, as generally acknowledged by all civilized and semi-civilized nations, is that all persons not actually in arms or accompanying the armed forces as active assistants are exempt not only from physical injury, but also from capture other than temporary, or for specific departures from their positions of non-combatants.

This custom, therefore, guides us in certain contingencies as to choice of weapons, and imperatively forbids the use of any offensive machines that will involve necessarily the killing or maiming of non-combatants. A violation of this rule should subject the users of such affairs, when captured and convicted, to an ignominious death. Of course, cases may and do arise where the lives and limbs of the non-fighters must be jeoparded, as in the siege of towns, a battle in a thickly-populated region, etc.; but such cases are exceptional. The violation of the rule is incidental and necessary, and obtains whatever be the weapons.

Down to the so-called days of chivalry, history throws little light upon any distinctions as to legitimate or illegitimate weapons. To give or accept quarter was the exception, and no need was felt for discarding any particular arm for fear of punishment for its use by death at the hands of the captors. The weapons, except bows and arrows, were entirely manual, and whatever could reach and destroy the enemy was considered lawful. The laws of war were few in number and vague in form, and were based entirely upon "might making right." In the palmy days of the Greeks and Romans, who with reason classed themselves as the polite nations, the use of poisoned weapons alone was barred, though rather because the surrounding barbarians, from whom they wished in all possible ways to be distinguished, used them, than for any humane reasons based upon philanthropic sentiments.

For several centuries preceding the invention of gunpowder, the

only questionable weapon of any marked power was the famous Greek fire, concerning whose destructive properties many fabulous accounts have been handed down. It appears, however, to have been highly inflammable, and to have possessed the power of burning under water, and wherever it fell it made great havoc, from its inextinguishable nature. For many generations the process of its manufacture was kept a profound secret at Constantinople, the capital of the Byzantine empire. Other nations, thus debarred by necessity from its use, were energetic in denouncing it. The knowledge of its composition, however, gradually spread, and at the beginning of the gunpowder era it formed a recognized defensive and offensive element in most wars, from Western Europe to Asia Minor.

During the so-called days of chivalry certain quixotic ideas prevailed as to kinds of weapons and methods or circumstances of using them; but when it came to be a life-and-death struggle, when it got down to the earnest business incident to hard, tough fighting, the gallant knights of the period did not scruple to avail themselves of every possible device for injuring and killing the enemy, such as molten lead and boiling oil poured on the heads of the foe, without regard to the quality of the adversary,—the unarmored yeoman and the armored knight with head protected by a helmet of iron being equally honored in this practical libation to the god of war. The battle-axe would be used to lop off an arm or leg, and the victim be left to bleed to death upon the field of honor. The iron mace studded with knobs or spikes would be brought down with stunning effect upon the heads of the unfortunates within reach, and with bruised brains and mangled features they gave up the ghost after prolonged agony.

When, however, early in the thirteenth century this valiant chivalry of Europe began to fall beneath the leveling power of gunpowder, it raised a great outcry against this new weapon as being an invention of the Devil and its use unworthy a true knight. "Nevertheless, fire-arms soon established a firm footing in Christendom." The musket-ball, propelled by the invention of that good son of the Church, Friar Bacon, soon did away with the use of armor, and the pen of Cervantes gave the finishing stroke by eradicating the spirit of chivalry. With the first killing discharge both of gun and pen[1] "the doom of feudalism went forth. Plated armor no longer availed against the weapon of the peasant, and the mailed chivalry, who had trampled with iron heels upon popular rights, no longer could carry all before them, but like other soldiers were now as loth to be slain by unseen foes as the veriest villein in the host. As fire-arms became more general the slaughter of battles diminished, for an army outmanœuvred was an army at the enemy's mercy, and therefore beaten. Previously, in the

[1] Chambers's Encyclopædia.

hand-to-hand combats where victors and vanquished mixed pell-mell in single combat, a victory could only be really won when there were no foes left to slay. A battle as great as that of Crécy might now be gained with a loss to the vanquished of but a few thousand men instead of the thirty thousand who are said to have fallen victims to the English sword and bow."

The minds of mankind soon became familiar with this new explosive agent, but while all civilized nations quickly adopted the projectile weapon, many continued to regard as unlawful certain forms of projectile and methods of use. Each advance step in the perfection of fire-arms or manner of employing them was bitterly fought by the so-called humane sentiment of the age. This sentiment was, as a rule, but a pretext, for as soon as the knowledge of them became general opposition ceased.

We are all familiar with the order of the French vice-admiral, Marshal Conflans, forbidding the use of hollow shot against the enemy as being an unusual and infernal weapon, and therefore not to be used by polite nations. This was drawing the line very fine. I fear had this noble old military "salt" lived about the twelfth century B.C., he would have condemned as unusual and ignominious the weapon so signally effective when used by Samson in his single-handed slaughter of the ten hundred Philistines. Within one hundred and fifty years we find the use of hot shot, grape, canister, split balls, etc., severely denounced by the writers of the day as illegal and unmilitary. At the naval battle of the Nile the English were charged with the use of unlawful and infernal machines, because they succeeded in blowing up the French line-of-battle ship "L'Orient" with all on board. A hot shot had probably penetrated the magazine. At this period there seems to have been a distinction made between the use of certain missiles on the land and on the sea. The use of chain-shot on the field was deemed unlawful, but afloat no objection was made, as it was designed for cutting the masts and rigging of vessels, regardless of the equal liability of having men's bodies torn in two by the projectile. It is said that eels do not mind being skinned after they become used to it. The inconsistent authorities of that period must have based their opinions upon the equally absurd theory that sailors soon become habituated to being torn asunder by chain-shot, but that soldiers, being of different fibre, are unable to cultivate a taste for this manner of taking off.

In those days a great commander exercised his authority as frequently upon the sea as upon the land, and while he would hesitate long before using against a vessel in open ocean any device which would at one blow destroy the enemy, he withheld not his hand from resorting to such engines on land.

It was iniquitous to send a ship to the bottom, giving the crew no

earthly chance for salvation; but if a thousand men could be caught conveniently gathered over the prospective crater of a mine, it was considered a grand stroke to fire that mine at that happy moment and blow these warriors skyward with mutilated bodies, or bury them under the falling débris.

At this period, also, the better judgment of military mankind continued to forbid the use of poisoned weapons, and this prohibition was held against those not intentionally so prepared, as, for instance, bullets of copper or other metals liable to inflame the wound or permanently injure the health of the wounded. The argument was, that we may wound an enemy in order to disable him, but we have no right to take his life after being so disabled. Upon this point I will have a few words to say hereafter.

With the improvement in military machinery, and the daily increasing necessity for making headway against the immense military forces which the great nations of the world now organized and kept equipped for active service, many of these so-called philanthropic, but undoubtedly nonsensical, notions were rapidly dispelled. The struggle for military supremacy became so sharp that the necessity for more effective means of defense became generally recognized. Nevertheless, anything radical or out of the expected line of invention continued to call forth maledictions from the other side, and had to fight hard for a standing in the international court of public opinion.

Only a century ago, fire-ships—though frequently a part of the outfit of a fleet—were considered as unlawful, and their crews, if captured, suffered death; and only comparatively a few years ago, Lords Cochrane and Gambier of the British Admiralty Court denounced their use as a horrible and anti-Christian mode of warfare. It was argued that punishing the crews with death would make their use only an extreme measure, the crews knowing that they took their life in their hands when they volunteered for this hazardous service. That their use was infrequent is true, but rather on account of the extreme inherent danger of navigating such craft than from any great fear of the consequences of capture.

"In 1812, the 'Ramilies,' a British seventy-four, was lying at anchor off New London. Two Americans, knowing her to be short of provisions, fitted out a vessel with a hold full of powder and a deck-load of flour. A clock-work affair was arranged to explode the powder at a given time. The vessel was captured, as was intended, the crew escaping to the shore. The vessel was ordered to lie off at anchor near another prize, and was not hauled alongside the 'Ramilies' to unload as was expected."[1] When the explosion took place, the small prize crew only went aloft instead of the six hundred men in the "Ramilies."

This act was loudly decried by the English writers of transient and

[1] Admiral Dunsany.

permanent history, and there is no doubt the crew, had it been captured, would have been summarily hanged.

It is a remarkable historical fact that ricochet firing for a long time encountered much opposition, and many commanders forbade their gunners to use it. The Congreve war-rocket was, at first, loudly denounced as an unlawful implement, and even gave rise to some versification on Sir William Congreve, which went the rounds of the English press, to the following effect:

> "At his old vocation the worthy knight
> Did labor long and well,
> And perfected his inventions
> In the crucibles of hell."

Our own jurist, Wheaton, one of our greatest authorities on international law, rather doubtfully asserted that a steam-vessel on the defensive might throw steam or boiling water; and a later critic asks the question, without answering it, however, "May a ship on the offensive boil their enemies alive?"

During the Crimean war, the righteous but unreasonable wrath of the "goody-goody" and benevolent people of France, England, and this country was greatly excited because it was reported that Russia had accepted and adopted the invention of an ingenious American, which, as an infernal machine, could blow up a line-of-battle ship and instantly destroy all on board. This invention had been rejected successively by the governments of the United States, England, and France, probably because they doubted its efficiency; but, as alleged, because it was unlawful. The outcry of England and France against its use by another nation with whom they were at war can be readily accounted for: it threatened to paralyze their whole navy in an attack on Russian ports. The reason for the denunciation by certain Americans is not so evident. Nothing was said against the subterranean mines of the combatants at Sevastopol, which daily sent to their happy hunting-grounds, in a most dismal and disagreeable manner, hundreds of men on both sides. Here, with a vengeance, was a distinction without a difference. This so-called infernal machine was nothing more than a crude kind of torpedo, the more perfect and far more destructive forms of which are to-day accepted without question.

During the recent insurrection in the Southern States, Northern papers held up their editorial hands in holy horror because the insurgents endeavored to blow up one of our vessels or transports by surreptitiously introducing into the bunkers a torpedo disguised as a lump of coal. These same papers howled madly when the U. S. ironclad "Housatonic" was destroyed by the submarine affair known as the "David," but failed, very properly of course, to have anything but eulogiums for Cushing and his gallant crew after they had sent the

"Albemarle" to the bottom. The "David," from its subaqueous character, was denounced as unusual and secret, and therefore illegitimate, though the crew valiantly perished with their enemy. Cushing, with equal secrecy, went after his foe under cover of an intensely dark night, and while equally successful in accomplishing his object, unlike his prototype, escaped without loss of life or injury to limb. This blowing hot and cold with the same breath shows how little formulated were the laws of war as regards torpedoes at so recent a period as our late civil war. Execution as felons, without benefit of clergy, would have been meted out to such crews on either side if captured; yet, surely, the common sense of the true soldier who thoroughly appreciates the stern realities of war must characterize such treatment as judicial murder.

We see, then, from this historical review that every invention has, while new, strange, and unusual, met with opposition from the ostensibly humane side of civilized mankind, but that when the people have become familiar with its nature, use, and effectiveness, they have by general though tacit consent accepted it as a lawful member of the family of legitimate weapons. The only exception to this, perhaps, has been the explosive bullet; but its adoption is, I imagine, only a question of time.

Let us consider, now, the legitimacy of our several military engines, either actually in use or awaiting adoption, remembering always that war is a bloody and hard-hearted business at best, and that the great object of war is to destroy as effectually as possible the armed forces and military resources of the enemy.

Many of the former absurd opinions concerning the lawfulness of certain implements were founded on sentiment rather than reason, on philanthropic grounds rather than upon those of common sense. They were the result of the meretricious teachings of a pseudo-chivalry, and were not dictated by the stern demands of war. The tendency of the present day is towards the adoption of what has heretofore been close to the line of legitimacy.

It is too fine a distinction to say we may fire a thousand-pound projectile into a ship three miles away, sending it and its contents in one short minute to a watery grave, but we may *not* throw on to it a barrel of burning petroleum, and thus accomplish the same result by other means. It is well known that the loss of human life, proportional to the numbers engaged in the great battles of the present day, nowhere reaches that of like engagements of old; and though "humanity has now provided wholesale methods of shortening human sorrows," the relative slaughter is greatly diminished, though the loss of life due to the single action of some of the weapons is much greater. The Roman warrior, dirty, gory, and begrimed after his day's pitched battle, could count his slain piled up around him, but at arm's length only. The

high private of to-day may with one discharge of a weapon lay out even a greater number, and at several miles' distance.

This proportionately less destruction being established, is it true humanity to declare that wholesale methods of destruction shall not be employed? Most assuredly No, unless such be accompanied by unnecessary torture, which will obtain could the same results be accomplished by more merciful means.

If, then, we admit to usage all modern weapons, and continue to admit others still more destructive, we must also accept as legitimate such usage on the part of the enemy, and his immediate agents when captured must be entitled to protection of life and limb, and treated as ordinary prisoners of war. Here must be noted a distinction. No enemy, if surrounded or taken in the act of using any destructive engine, be it even the sword or musket, is entitled *per se* to quarter. In the heat of the fray we use such means as we can to kill or disable our opponents, otherwise he may gain an undue advantage. In the terse and strong, though inelegant language of the frontier, "he will have the drop on us." We kill him to keep him from killing us, but it is done in hot blood. If his surrender be once accepted, however, and he be disarmed and placed where he can do us no injury, I think he is entitled to be treated as a prisoner of war, no matter what we may be able to prove against him as to his use of infernal machines in the field or the siege.

It has been said that exceptional means of attack require to be met by exceptional modes of reprisal. That to prevent the enemy using terrible or wholesale engines of destruction we must make the consequences of capture equally terrible, by subjecting his prisoners to ignominious execution. But this is fallacious, because it is difficult to draw the line between the exceptional and unexceptional, and its application fails to accomplish the desired results, and, moreover, debars the other side from using similar weapons in its own defense. Brave men will not hesitate to go into action with tremendously effective weapons because they fear the personal consequences of capture, but rather because the very use of such weapons is in itself an extremely dangerous thing.

Let us now take up some particular cases and mark out our line of action. Bows and arrows are no longer used except by savage tribes, because we have devices more effective; but supposing we had nothing else, should we hesitate about adding to their effect by poisoning the barb? I fail to see why we should not do so. We have the enemy before us. Our business is to destroy him. With the clean arrow we may disable many of his men, but in subsequent campaigns these men, fully recovered, confront us again. With the more deadly bolt we have permanently gotten rid of just so many of the foe as have been wounded, in addition to those killed outright. That this is a sound view our own practice supports. Many of our Indian tribes of to-day use poisoned

arrows, and many brave men have been permanently disabled by them, but has it been the custom to execute our Indian prisoners on this account? The same may be said of poisoned bullets. We use lead because it is cheaper and more easily cast, and therefore more convenient, but had we only copper from which to fabricate our projectiles, should we hesitate about casting it into bullets because the metal might inflame the wound inflicted? I think not. Our object is to permanently diminish the numbers of our enemy. If we fail to kill him outright, why not put him out of a subsequent fight by breaking down his health? With the leaden bullet we either wound or kill; if the former, we must see our foe live to fight us another day. With the poisoned bullet we may feel assured that each shot has made either a clean miss or else placed at least one more man *hors du combat*. Let us, therefore, call on our chemist to prepare us a mixture for application to the bullets which will cause of itself speedy death after the wound. Or better still, let us adopt the explosive bullet. How many times on the eve of battle have we not heard brave men express the hope that they will be killed outright and not have to suffer the agony and torture incident to being wounded by the bullet or shell! This feeling is, I think, far more common than is generally supposed. The explosive bullet will accomplish this result much more effectively, and certainly with as little pain, as the ordinary bullet. Every shot from the old smooth-bore was delivered with the intention of killing, but the number merely wounded was too greatly disproportionate to those killed. Then followed the rifle to be more sure of killing, and next the breech-loader to kill more in a given time. Shall we not, then, continue to call to our aid the help of science and make the slaughter thorough, and not attempt to palliate the certain mental intention of killing by simply refraining from the use of such an effective weapon as the explosive bullet fired from a rifled breech-loader? I can think of but one thing that might mitigate this course. The history of more recent wars shows that hostilities now seldom extend over more than one campaign. The custom of the day is that it shall be short, sharp, vigorous, and decisive. In general two or three great battles decide the affair, and these in one season. In such cases a temporary disablement of a sufficient number of men is all that is necessary. When they recover, the war is over for better or worse; their services are no longer needed. Any aggravation of the disablement might be considered as wanton cruelty and therefore unlawful. But we cannot always tell beforehand about the number of campaigns; the cautious commander will make assurance doubly sure by killing, in the heat of the conflict, to the greatest possible extent, and if but one campaign, he may be able to decide it in one great battle, thus really effecting a great saving of life.

Let us next consider the case where one of the combatants learns that the enemy is fitting out a naval expedition accompanied by troops

in transports. The objective-point is unknown; but, whatever it may be, the defense knows that it must destroy this expedition before it reaches its destination, or else so impair and demoralize it that when there it may be successfully encountered. Its own naval force is inadequate. May it resort to the secret introduction on board the enemy's fleet of explosive devices disguised as lumps of coal, or naval supplies, which, when fed to the furnaces, or after the lapse of time or by rough handling, will explode and destroy, or otherwise injure, the vessel and its machinery? My opinion is that this would be legitimate.

Practically, it would perhaps never be sufficiently powerful to destroy a vessel, but we may reasonably expect injury to the machinery of some vessels at least, and the moral effect of even a few such explosions upon the rest of the fleet, feeling as they must that they have similar affairs keeping company with themselves, will do much to disorganize unity of action and weaken the force of attack. It will be claimed that the use of such affairs may cause the death of non-combatants, such as servants, officers of transports, or others engaged innocently in handling them. But such can never strictly be called non-combatants. When a frigate goes into action, every one on board is liable to be killed. The coal-heaver cannot argue with the bursting shell that he is unarmed and should not be hit. So in the fitting out and working of troop-ships. All hands must be considered in the light of combatants, and liable to every risk incident to war. Hitherto such vocations have been attended with but little danger. We simply make life less enjoyable for this class of public servants by increasing their chances of being killed, just as the extreme range of the modern rifle has augmented the risks of teamsters, hospital attendants, and camp-followers in rear of the field of battle. I think the outcry during our war against the attempts of the rebels to introduce coal-torpedoes on board our transports was due to the terrible novelty of the thing, rather than for anything founded on the dictates of humanity.

In the same category comes the matter of burying percussion-shells in the roads over which we expect the enemy to advance. This was done by the rebels on several occasions, and the shells were unearthed in detached pieces by the horses of our advance cavalry, much to their own discomfort and demoralization. Of course, the usual howl of barbarism, savage warfare, etc., found abundant vent in the daily papers as the sentiments of the people who stayed at home. I do not remember, however, that our people in the field made any great row about it. *Per contra*, I imagine they thought it rather neat, and probably stored the idea away for future use regardless of patent laws, and thereafter paid more attention to their footsteps. The argument against these shells is, that being buried in the common roads of the country, they endanger the lives of people living on the theatre of war. But are not the lives of people dwelling in such a neighborhood always in more or

less jeopardy? We simply make the peril more rather than less. If we abandon this means of defense, with equal reason must we surrender the use of stationary submarine torpedoes, which, though intended solely for use against the war marine of the enemy, may possibly become a peril for vessels of the commercial marine. Yet this defensive accessory is now universally accepted the world over as legitimate. A rule of warfare for the sea should hold equally binding on land.

We next reach the question of water-poisoning. To cut off or render useless or dangerous the water-supply of a country through which an enemy is advancing is an effective method of materially retarding, if not of entirely checking, his progress. Campaigns have been essentially affected and battles have been fought on account of some region of abundant water-supply. The battle of Perryville, Kentucky, was, to some extent, an effort of the rebels to retard our advance and subject us to great inconvenience for the want of water. In and immediately round Perryville, held by Bragg, there was a copious supply of excellent water. The radius of this district was very small, and outside of it, directly in the line of our advance, owing to a dry summer, the small springs and streams had failed, and the wells were few and far between. On the day of the battle our army suffered much for want of water. All that the brigade to which I was attached had that day came from a kind of cattle or hog wallow, and was muddy, stagnant, and nasty. That night, after the heat and brunt of the day, our men got but little water, and that not fit to drink, and only tolerable when boiled for coffee. Had Bragg been able to hold us for twenty-four hours longer, Buell would have been obliged to make a diversion in some other direction to obtain water for men and animals, and had the water in Perryville, which we got possession of next morning, been rendered unfit for use, we would have been thoroughly demoralized.

In the second advance on Jackson, Mississippi, immediately after the fall of Vicksburg, we found many of the wells and watering-pools for stock contaminated by the putrefying bodies of animals, thus practically poisoning the water. This made things very disagreeable for us. As far as I remember now, however, no one vituperated this action of the rebels as barbaric or savage; we probably damned them pretty roundly for causing us so much inconvenience, and then, dropping the matter, hustled around all the more lively to better our condition.

I will, for the moment, suppose myself the commander of an army retreating before a powerful enemy. I must retard him in every way possible. It has long been recognized as legitimate to accomplish this by completely devastating the country before him by destroying all food and forage; and if in winter, by burning all buildings which would give him shelter and, if possible, his firewood, in the shape of timber, fences, etc. Of course, if a thickly-populated country, this works great

hardship to the inhabitants, and probably causes many deaths from starvation and exposure. I recognize this as a dire necessity of war, but carry it out to the utmost. My enemy being well supplied with rations and forage, continues his advance, and can go on for a definite time sufficient to accomplish the purposes of his campaign. Water, however, for men and animals it is impossible to carry for more than two days; an additional day's advance will lead to the practical demoralization of the army. Shall I not, then, deprive him of water as well as of fuel, food, and forage? Nay, more than this, does not humanity dictate that I should have *first* destroyed his water-supply, that being in itself sufficient to check him, and not have devastated the country in addition? Was not all this useless burning and destruction a crime? I certainly regard it in this light. And I would consider that I had caused less permanent damage to the country, and had displayed more real humanity, by poisoning the water to the utmost extent and leaving the other artificial and natural features of the country undisturbed. I would leave for each family a limited supply of water sufficient for their own use for a few days, but only a drop in the bucket for an invading force. If the enemy deprive the people of this, the onus is upon them. Practically, it would be impossible to permanently injure wells and springs by poison, so that no continuous ultimate harm would be done. Of course, the inhabitants should be warned; and I don't know but what I would placard the fact of the poisoning, so as to give the enemy the benefit of the information, my object here being not to kill him by poison, but by thirst, if he be foolhardy enough to continue his advance. Some non-combatants may be killed, but not near so many as in case of a battle on the same ground.

Let us now turn our attention to Böhm's invention of the Greek fire torpedo-boat. I imagine in principle it amounts to the close approach to the enemy's vessel and the projection on board of large, flexible, or at least weak-shelled projectiles filled with some highly-inflammable liquid. This projectile, upon striking, bursts, and the liquid, igniting, runs over the vessel in all directions, and is inextinguishable. This compound will also float and burn on the surface of water, so that a few cases simultaneously projected at different points against the sides of a vessel soon surround it with a sea of fire, tremendously effective against a wooden or semi-wooden vessel, and not to be despised by a stoutly-mailed ironclad. If this can be improved so as to cover the latter with a durable sheet of flame, even its thick armor will not save its crew from a roasting. Well, all this is pretty bad; that is, for the enemy; and I don't know that I am prepared to indorse it in its entirety, though I feel sure that as a fleet commander I would have a few such boats at hand in case of an emergency; their moral effect would be great. If I could use them partially,—that is, destroy the vessel only by fire, giving the crews a

chance of a comfortable drowning instead of an unpleasant roasting,—I don't think I should hesitate as to their use. I don't approve of making a holocaust of the living bodies of the foe, if I could kill them in a more humane way. If on the defensive, I should certainly call to my aid every known means of driving off or destroying the enemy.

Suppose that the inventive genius of the age perfects some effective projectile whose explosion will liberate a large volume of gas capable of producing asphyxia, say of a thousand men at a time. Shall we use it? Efforts in this direction have been made, though so far with but little practical result. This problem has yet to be worked out. But suppose it solved, what then?

John Heffler, writing in 1873, says, "The laws of humanity forbid, also, using means of destruction which at a single blow by mechanical means beat down whole masses, thus reducing man to the rôle of an inert being." But this is only John Heffler's opinion, and I cannot admit his right to affirm the proposition as one based on treaty or custom, or to arrogate to himself the interpretation of the laws of humanity. Give me an effective gas projectile which will demolish one thousand or even one hundred men at a blow, and though the laws of humanity may condemn me, I will use it to the utmost with a satisfied conscience, feeling that it is a very desirable weapon and worthy of all acceptation. The laws of war will be quick to recognize its usefulness. I fear I should also place myself outside the pale of human law if some skillful inventor were to place in my hands the two poles of some gigantic electrical battery, whose continuous discharge would paralyze whole regiments as fast as they could be brought within reach.

When aerial navigation becomes a fixed science, and not, as now, strictly a tentative affair, will we not be sending up balloons to rain upon the enemy from directly overhead every possible device for burning his buildings, blowing up his magazines, and destroying his *personnel?* To fail to use such affairs when practicable would be, I think, a neglect of duty.

This brings us to the salient military feature of the day, the torpedo in its several forms and functions by land and sea. Of these there is not much to be said; their frequent use of late years has made the idea familiar and therefore less abhorrent, and the sentiment of the day accepts them as legitimate weapons. Still, as far as I know, we have no precedent as to the treatment of the crews of torpedo-boats if captured in the attempt to blow up a vessel. No captures have yet been made. The crews have either escaped or been "hoisted by their own petard," with or without the company of the crew on whom they were inflicting their dangerous presence. As a fleet commander I should, probably, after the destruction of one of my vessels, bring every gun to bear upon the torpedo-boat, so that the chance of capture would be small; but suppose the crew haul down their own, or hoist a white flag?

Well, I think I would accept their surrender and treat them as prisoners of war, and also exact from the other side similar treatment for my torpedo crews. But as one swallow does not make a summer, so would not the action of one commander make a law morally binding on nations. It would, however, be a precedent, and in time would have its effect.

One other case and I have finished this citation. Suppose the enemy from his fleet cruising off the coast, by night or under cover of a fog, secretly enters our harbor and sprinkles it with torpedoes? Is such a proceeding lawful? I should say, Yes. It is our business to take every precaution to guard our own preserves, and if the enemy be skillful enough to accomplish such a task, let him have what benefit he can. To be sure, unlike in the case of the aggressive torpedo, the crew runs no risk of destruction inherent in the apparatus it controls, and if treated as prisoners of war its immunity is perfect, causing such attempts to be of constant recurrence. But the expectation of such attempts and the consequent precautions taken will do much to militate against them, especially if the trespassing crew knows it is liable to be received by a warm fire from guard-boats. The success of such an attempt depends upon its entire secrecy; once discovered and it is rendered abortive.

With this I submit the question for your discussion. I am aware that the expressions of opinion herein are only individual, but as such they are very decided. To many they may appear too extreme, and at first sight may seem blood-thirsty and cruel, but they will doubtless lose these attributes to a great extent under the light of intelligent discussion. I am open to argument upon this as well as upon most other subjects.

Whatever the individual opinion may be, however, it matters little; my object in presenting this matter is to open a discussion which may in some sense commit us as a representative body to some definite policy. Let our officers publish to the world what our probable course will be, and then there will be no misunderstanding as to our position.

I think Lieutenant-Colonel Fosberry, of the Bengal Staff Corps, has about the right idea as to the treatment of such matters, and in conclusion I will quote him:

"An important advantage has not unfrequently been gained by that nation which first sees the utility, overrides the objections, and boldly uses newly-invented though terrible engines of war. The objections usually made are, in general, that such affairs are satanic. In particular, they are cruel methods of destroying your enemy; only to be classed with the bushman's arrow or blow-gun, and wourali poison, says one, and takes to himself credit, and honestly enough, I doubt not, for humanity and a kind regard for the comfort of his fellow-creatures, even when arrayed in arms against him. Yet he will take a scientific

pride in the acknowledged weapons and usages of war, and use them with a good conscience to the best effect. An enemy approaches him by sea, let us suppose; he charges that enemy's vessel with his ram and involves eight hundred souls in a common and instant destruction. He fires a torpedo under his feet by electricity from a wooden shanty two miles off with like effect; or, finally, he pours from his furnaces into his Martin shells the molten iron which shall burn its way alike into the wood of the ship and the tortured bodies of the seamen; in effect, in the terrible words of the old letters of marque, he burns, sinks, and destroys the human element inclusive. On land, he disembowels him with rockets, buries in his path the self-acting fougasse; tears his body with the angular fragments of segment shell; plies him with grape and canister, old iron, and broken bottles; undermines him; fills up his wells, and destroys his habitations and supplies, and makes him either to die of hunger or thirst and exposure, or to linger, it may be, for weeks from the fearful wounds of the bayonet, the sabre, or the Snider-Enfield bullets; the latter, by the by, almost equaling in their effects on the body anything produced by the explosive bullet, as may be seen by the fragments into which a bullet divides when fired into water. All this, moreover, with the best possible intentions and most serene good faith. But let me ask is this really humanity? Are any of the deaths to which the greater number killed in war are put, strictly speaking, humane? or, if they are not, what is this humanity of which so much is made? Is it indeed a branch of that quality which leads us to clothe the naked and feed the hungry, only developed in another direction? or, is it not rather a term of variable quantity applied to homicidal cruelty, and so adjusted as to be always just one step behind the last military discovery of the day? Have we not heard that in the dark ages humanity beat out men's brains with a mace, whilst cruelty used the lance, the sword, or the arrow; and that bishops of the period, therefore, rode into action with the mace so as to kill without shedding blood? A very nice distinction indeed, as you will admit. In later times were not Congreve and Shrapnel denounced as monsters for the initiation of inventions in whose perfection we rejoice to-day? And did not even General Elliot's red-hot shot find objectors besides the unhappy crews of the Spanish blockade ships? Do not think when I speak in this way that I am proposing new methods of death and doing a little by special pleading for their adoption. I am merely endeavoring to place before you the light in which similar inventions of accepted value have been regarded in times past, and meeting the question as to whether the present objectors to the use of new inventions have or have not more right on their side.

"In fact, the old argument holds good for each fresh step in advance. The more terrible the recognized engines of destruction, the greater will be the prospects of maintaining peace; or, should war

break out, the shorter of necessity will be its duration. As this is an object for which we all, soldiers as well as civilians, should strive, I trust that these new machines may receive, at all events, thoughtful consideration as candidates for the office of peacemaker to begin with, and as having a tendency to shorten any war once begun, where their use is properly persevered in. Again, one great argument for their use is the production in the minds of the enemy of that feeling which is, say what you will, at least akin to the sentiment which more than all the bloodshed in the world has lost us battles, and which it should be the object of every improvement in war material to produce, whether by its known or its supposed effects. I mean *fear*. Such dread would tenfold attend the steps of a power which should be known to possess these destructive engines and boldly declare its intention of using them. I firmly believe that as great or greater effect would immediately accompany their first use than has accompanied the substitution of the muzzle-loader rifle for the smooth-bore, or the breech-loader and magazine-gun for the muzzle-loader.

"Save us, therefore, from the cruel mercies of the weak. War, that splendid mistress for whose favors we have all striven since we reached man's estate, must be given her full attributes and painted in her most deadly colors, in order that the curses which undoubtedly she brings to the majority of the population may extend over as short a period as possible. Let us make her as deadly as we can in the name of humanity and of every good feeling."

CLINTON B. SEARS,
First Lieutenant, Corps of Engineers, U. S. A.

WHIFFS FROM AN OLD SAILOR'S PIPE.

WHIFF THE THIRD.

HOW WE STOPPED THE LEAK.

"It hath been a turbulent and stormy night;
I have been in many, but such a night as this,
Till now, I have ne'er endured."—SHAKSPEARE.

ABOUT twenty-five years since, during the winter season, the steamer "Persia," of the Cunard line, arrived in New York from Liverpool on her first trip. She was a new vessel, that had been modeled and built for speed as well as strength, and to compete with the time which the vessels of the famous Collins line of American steamers were making in their passages over the Atlantic.

One of the steamships of this Collins line had been advertised to leave Liverpool at or near the same hour as the Cunarder mentioned, and heavy bets had been made as to which of these vessels would make the quickest passage, opinions differing in every case in accordance with the nationality of the persons interested.

As several days elapsed after the arrival of the "Persia," with no appearance of the American ship, the chagrin which her backers felt gave place to a fear lest an accident of grave import should have happened.

This feeling became intensified as vessels arriving about this period reported falling in with heavy field-ice, and also as having seen bergs far to the southward of the latitude in which they are usually met with. It likewise became known that the "Persia" had on her passage hither ran into a small berg or heavy field-ice, and that in this collision her bow plates were crushed to a considerable extent, *from which damage, but for the fact of having been built with compartments, she would in all probability have gone to the bottom.*

Under these circumstances, prominent citizens of New York requested the Navy Department to send a vessel in search of the missing steamer. The only available one the Department had at this time was the little steamer "Arctic," then lying at the Brooklyn Navy-Yard,

and she was promptly placed at the disposal of the applicants, and the navy-yard authorities were directed to get her in readiness with all dispatch.

This vessel had returned from a cruise in the Polar regions only a short time previously, having been cruising there in search of Dr. Kane's expeditionary party.

Originally intended for use as a "light-ship," to be anchored on the "Sow and Pigs" shoal, her hull had been constructed with great strength, to enable it to withstand the heavy seas that are always raised on those shoals by the violent gales of winter.

Owing to this strength of build she had been selected, while yet "on the stocks," by the officer who was to command the Polar party, as being the most suitable vessel he could find for the service on which he was to be sent, and as the one which, with some alterations, would have the requisite strength to resist any "ice squeezes" she might have to undergo during the cruise in those northern latitudes.

The Navy Department had, therefore, on his suggestion, purchased the vessel and altered her into a steamer, with a small auxiliary engine and propeller having power enough in perfectly smooth water to give a speed of four knots.

She was rigged as a brigantine, and under sail could make eight knots if the wind and sea were favorable.

Owing to the weight of boiler, engine, and coal when stowed for sea, she trimmed very much by the stern, so much so, in fact, that while aft her deck was not more that *four feet* clear of the water, forward it was at least *seven* feet.

From this description it will readily be perceived that the "Arctic" was in no respect fitted to be a cruiser, or capable of rendering aid to any vessel needing it during bad weather. She was an odd-looking craft,

> "And, taking '*her*' all in all,
> We ne'er shall look upon '*her*' like again."

A volunteer crew of five officers and forty men was soon made up from those on board the receiving-ship "North Carolina," and while they were hurriedly getting their traps together for this sudden departure, the navy-yard authorities were as hurriedly preparing the vessel for sea.

After stowing her full of coal, provisions, and stores, they filled her spar-deck, or rather the waist, with lumber, even with the rail; for what purpose this was to be used, not one of us on board could imagine, and even to this day I have been unable to find out; perhaps it was for building rafts, or in lieu of life-preservers.

In a few hours everything was in readiness, and we steamed away from the yard amid the cheers of at least a thousand persons, who had

assembled on the docks to witness the little craft depart upon her errand of mercy.

Early in the evening we arrived outside the bar, discharged the pilot and stood to the eastward, with a light southerly wind, clear weather, and sea as smooth as a mill-pond. During the first twenty-four hours, our time was fully occupied in finding where things were stowed, in putting them to rights, and getting into a ship-shape condition.

We found a number of boxes filled with fresh provisions packed in ice, sufficient in quantity to last a year's cruise,—the friends who had sent these contributions to our larder evidently determining that our "inner man" should not suffer, no matter what hardships the outer man might have to undergo.

These friends had also provided a cook, who, if appearances indicated anything, indicated good living, for he weighed at the least three hundred pounds; in stature he was about five feet; these solid qualifications proved eventually to be of the greatest importance.

On the second day the wind freshened, and banking fires, we trusted entirely to the sails; but as the wind increased in force, so did the sea in height, and an occasional comber breaking over the rail proved to us that the "Arctic" was not to be much of a sea-boat in case really bad weather should be encountered.

Shortly after the sea had commenced to break on board, a leak was reported, the water entering the fire-room through the port coal-bunker; it did not amount to much, as the occasional use of the "donkey-pump," running at half speed, served to keep the water down.

As the day wore on, the wind gradually increased in force till it became a gale, with a heavy sea accompanying; by night it was blowing a hurricane from the south-southeast, and the rain descending in torrents. We had shortened sail as required from time to time, until we were "lying to" under a close-reefed fore-topsail and balance-reefed mainsail. The leak at this time had certainly become troublesome, if not dangerous, requiring the donkey-pump to be run continuously at full speed, and this barely served to keep the water from rising over the fire-room floor. With much labor we managed to secure a sail with heavy mats outside the hull, over that position where the leak was supposed to be; but it was of no use, for the water still continued to pour into the fire-room through the port coal-bunker.

Knowing that southeasters upon our coast are short-lived, winding up with heavy rain and then with a sudden shift of wind to the northward and westward, we wore ship, and kept a bright look-out for the expected change. It came at midnight, due northwest and butt-end foremost, bringing bitterly cold weather along with it, which, very shortly, coated everything above hatches with ice. The sea, from the shift of wind, became very irregular, breaking on board at all points,

from aft as well as forward, with almost a continual swash from each side. As the water came on board so did the leak increase, and the donkey-pump not being capable of freeing us, we were obliged to hook the "bilge injection." We then prepared the boats for lowering, placing a bag of bread and a bundle of blankets in each, it being, in the opinion of the officers, only a question of time—and that not a very distant period—before the vessel must go down. These boats were two in number, and large enough to hold all hands in case nothing was placed in them additional to the bread and blankets mentioned. We determined, however, to stick to the ship until the last moment that we possibly could, as it was very doubtful if boats could live in such a sea, and if they did, it was still more doubtful whether any one in an open boat could survive the intense cold that we were experiencing. So we bailed as well as pumped, anxiously looking for daylight.

The weather at this time was clear; the barometer very low, rising slowly, if at all, this indicating the gale would be of long continuance. As the sea became more regular it did not break on board as frequently, and our hopes were correspondingly increased. Suddenly a green sea curled over the bows, flooding the decks; the leak increased, the fires were extinguished, and the engine, with one long-drawn sigh, ceased to work, *and the "Arctic," with ten feet of water in her engine-room, but with not one drop forward, was sinking, going down stern foremost!*

A rush was made by the crew for the boats; but the stern voice of command was heard above the din of the elements, "Be quiet, men! Mr. Bowline, take charge of the port boat. I will take charge of the starboard. Now, starboard watch, starboard side; port watch, port side. Clear the decks! throw everything overboard! Work with a will, men; work for your lives!"

They did so; and in an incredibly short space of time the decks were cleared, both the wind and the sea seeming to aid us in our struggle for existence, as the one lulled temporarily and the other ceased to break on board. When the last plank of the deck-load of lumber was thrown clear of the side, the cause of all our trouble was plainly in view. The source of the leak was apparent. *A coal-bunker plate had been left off, and was not on board!* and careless workmen of the navy-yard had stowed lumber over the hole. Consequently, every drop of water that came upon the decks went below through the open bunker down to the vitals of the ship. . . . My action was taken instantly, for should another sea roll over us, or a swash merely come on board, before that bunker was closed, sink we must.

"COOK, SIT ON THAT HOLE!!"

He did so, covering the aperture completely! The leak was stopped!! Fortunately for us that it was, for scarcely had he taken his seat ere another green sea tumbled over the rail, deluging our decks;

but our cook sat firm, and ocean's proud waves were stayed from ingress to the depths of the vessel.

I protected the cook from the water and weather as much as possible, covering him with blankets, and at daylight relieved him from that uncomfortable position, sealing the bunker with tarred canvas and sheet-lead.

"Imperial Cæsar, dead and turned to clay,
Might stop a hole to keep the wind away;"

But our great cook, though no imperial lout,
Did stop a hole and kept the water out.

We bailed all night and until noon of the day, and, as no more water came in the vessel's hold, every drop we discharged, told. Having lowered it sufficiently we started fires, and steam soon freed us from all that remained, and the "Arctic" was "as tight as a bottle."

For three days the gale continued, during which time we were compelled to "lie to," all hands being as uncomfortable as can well be imagined, the decks being continually under water.

When it moderated, we made sail, and stood to the eastward, keeping as near to the track taken by ocean steamers as possible. Occasionally we met with and spoke a vessel, but could learn nothing from them in regard to the missing steamer.

When we arrived off "Sable Island" the weather was fine, so standing in to the northwestern end, we anchored, sending a boat on shore to inquire if aught had been heard in regard to her. As this island is in the track of vessels bound to and from Europe, it was decided to examine the shore thoroughly, as many vessels have been lost thereon. We did so, but could see nothing lately wrecked. Then we stood again to the eastward and cruised. Days passed, weeks passed, and still we cruised: finally giving up all search as hopeless, we turned the vessel's head westward, and arrived back at the navy-yard after an absence of nearly two months.

The steamer "Pacific," of the Collins line, was never heard of after her departure from Liverpool.

E. Z. Bowline.

POST-GARDENING.

GARDENING, in its higher sense, is both an art and a science. It has arrived at this estate by gradations, slow compared with the development of many other pursuits, but that is consequent upon the complex nature of its parts. The development of a knowledge of geology, chemistry, meteorology, vegetable physiology, and botany—indeed, something from all human learning—has gone to perfect the science of Agriculture and Horticulture,—pursuits affording as wide a range of research in their ramifications as any topic occupying the mind of man, and as important in their results as any occupation of man. Agriculture, though pursued in early days without any correct knowledge of cause and effect, was always held in high esteem. Columella, contemporary with Virgil, wrote, "The art of husbandry is so necessary for the support of human life, and the comfortable subsistence and happiness of mankind have so great a dependence upon it, that the wisest men in all ages have ascribed its origin to God as the inventor and ordainer of it, and the wisest and most civilized nations, who have best understood their true interests, have always endeavored to promote and improve it, and have never failed to acknowledge and honor as public benefactors all such as have contributed anything towards the same." In colonial days our forefathers were almost entirely dependent upon agriculture. Washington, in his agricultural correspondence with Sir John Sinclair, wrote, "It will not be doubted that, in reference either to individuals or to national welfare, Agriculture is of primary importance." Webster, of our own generation, wrote, "Agriculture feeds us, to a great extent clothes us; without it we could not have manufactures, and we should not have commerce. These all stand in a cluster, the largest in the centre, and that largest is Agriculture." Agriculture is indeed the most fruitful source of the riches of a country, and of the welfare of its inhabitants, and only as the state of agriculture is more or less flourishing can we judge of the progress of a people.

Gardening, which is agriculture upon circumscribed spaces, has ever shared with the latter the esteem of mankind. Socrates said, "It is the source of health, strength, plenty, riches, and honest pleasure;" and

an eminent English writer said, "It is amid its scenes and pursuits that life flows pure, the heart more calmly beats."

Agriculture refers to the tillage of the earth over broad fields, as for the raising of cereals, grass, or tubers. Gardening, on the other hand, refers to the culture of small inclosed spaces. This application of the latter term was quite correct originally, but it is now common for mere vegetable gardens to equal the area of ordinary grain- and grass-farms, requiring in their cultivation a degree of skill and an amount of activity, implements, and labor exceeding that expended upon any grain-farms in existence. Such a cultivation, to be successful, must be to some extent scientific. The cultivator must possess a knowledge of the facts and principles that underlie his art, or he will certainly fail.

The development of field and garden culture to its present condition is the result of the union of theory and practice. The greatest expansion has been in a chemical and physiological point of view, and this development, strange as it may seem, dates back not farther than forty years. Agriculture and Horticulture before that time may be said to have been conducted under a Virgilian system, cultivators adhering more to blind custom than to reason. In the year 1795 the first book in English upon the relations of Agriculture and Chemistry was published, and, though containing some truth, its teachings are ridiculous under the light of the present day.

The first accurate analysis of a vegetable was not made till the year 1810, and so late as 1838 the Göttingen Academy offered a prize for a satisfactory solution of the question whether the ingredients of ashes are essential to vegetable growth. The last forty years have placed Agriculture upon a scientific foundation, and the strides of development have been wonderful. The investigations of all scientific men in their particular pursuits have served to dispel ancient theories and develop the intricate system of germination, subsistence, and growth.

Viewed in the light of the present age how ridiculous the directions of the ancients appear! Take Virgil's Georgics, for instance,—he, the prince of Latin poets, possessing at once the highest intelligence of his day, experience as a husbandman, and the stimulus of a royal commission to revive the decaying spirit of husbandry with the insinuating charms of poetry, how crude his teachings pertaining to the laws governing the development of nature in the vegetable and animal kingdoms! Charming to read even now, and correct still in many practices, we are continually jarred by directions the opposite of scientific teaching and experience. The ancients were ignorant of vegetable physiology. Virgil, Pliny, and Columella taught that any scion might be grafted on any stock; Pliny mentions the effect of grafting the vine on the elm, and other ridiculous unions. Notwithstanding the numerous superstitions of the Romans, they had acquired many facts pertaining to

husbandry; they pruned, watered, fenced, forced, and retarded blossoms and fruit much as we do. Cato, in the second century before the Christian era, writing upon Agriculture, said, "What is good tillage? first, to plow; second, to plow; third, to manure. The other part of tillage is to sow plentifully, to choose your seed cautiously, and to remove as many weeds as possible in the season." Thus, it will be perceived, quite a practical view of Agriculture was taken two thousand years ago. The ancients too took pleasure in country life. Virgil says,—

"Happy the man who, studying Nature's laws,
Through known effects can trace the secret cause,
His mind possessing in a quiet state,
Zealous of Fortune, and resigned to Fate!
And happy too is he who decks the bow'rs
Of Sylvans, and adores the rural pow'rs;
Whose mind, unmoved, the bribes of courts can see,
Their glittering baits and purple slavery."

The same poet gives directions for the making of a plow, as follows:

"Young elms with early forces in copses bow,
Fit for the figure of the crooked plow.
Of eight feet long a fasten'd beam prepare;
On either side the head, produce an ear;
And sink a socket for the shining shear;
Of beech, the plow-tail, and the bending yoke
Of softer linden harden'd in the smoke."

This style of plow could not have been much ruder than that of the early Britons, whose laws directed that no man should guide the plow till he could make one, and no animal should draw the plow but the ox; the horse being sacred to war and the chase. It may be interesting just here to note that the first record of the employment of the horse in Agriculture is noticed in the tapestry of Bayeux, woven in 1066.

Despite the teachings of the ancients, Agriculture has for centuries been weighed down by ignorance, prejudice, and imperfect action. The force of custom in every country has held the farmer in chains; and such still is, alas! too often the case even in this land of progress. But to what better pursuit can an able mind turn than to Agriculture? Without it men would live wandering lives, disputing with each other for the possession of such animals as they could catch, and for the spontaneous fruits of the earth. Without Agriculture there would be no bond of security, or love of country; it is in all countries the purest source of public prosperity.

Cowley quaintly says, "The first three men were a gardener, a plowman, and a grazier, and if any man object that the second was

a murderer, I desire he would consider that as soon as he was so he quitted our profession and turned builder."

Of what does gardening consist? Of obtaining from the earth vegetables and fruits for man; and the perfection of the art is to obtain the greatest possible product at the least possible expense. From the earliest times gardening has advanced, and receiving always the first attention, it has in each succeeding generation become more perfect than in the one preceding. No occupation affords a more agreeable result than that of gardening. Labor in dealing with inanimate objects has not that enticement and recreation about it which is ever present to him who, aiding nature, witnesses the results of daily toil in living plants changing their forms and colors day by day. Thus there is a deal of enjoyment to be derived from the different operations of gardening, independently altogether of the health resulting from the exercise.

One of the greatest of all the sources of enjoyment resulting from the possession of a garden is the endless variety which it affords, both in the processes of vegetation as it goes forward to maturity, dormancy, or decay, and in the almost innumerable kinds of plants which may be raised even in the smallest garden. Add to it a small greenhouse—what a source of pleasure and instruction does it not hold out to the amateur!—exactly in proportion as the out-door work becomes less urgent the in-door operations become more numerous. The amusements and the products which a small glass house affords in the hands of an expert or an ingenious amateur are almost without end.

The influence which a taste for gardening and its attendant studies has upon the minds of children is calculated to make them better citizens, by encouraging a depth of thought, and a desire to possess a spot of mother-earth as a home, about which they can practice their culture of fruits, flowers, and vegetables. The farmer and land-owner is always a conservative man in politics; he is slow to be carried away by influences affecting the population of our towns and cities; he is our safeguard in the hour of danger.

Good example, fortunately, as well as bad, is contagious. Government gardens devoted to vegetables and flowers will assuredly demonstrate the capabilities of soils and climates before the eyes of settlers, and stimulate them to like attempts. Unquestionably it will pay to establish at every post upon the frontier a large, well-appointed garden under the care of experienced men; and it is to be regretted that the United States Department of Agriculture has not taken this in hand long ago. Such a garden should be laid out upon liberal principles, and furnished with all the appointments to work it thoroughly. To the members of the garrison it would be a source of pleasure to the mind and eye, of comfort to the inner man, and in a hygienic view of high importance. To the settler it would be a *kindergarten* of just the

sort to suit his tastes, and one which he could not even look upon without having some of its features impressed upon his mind.

A man with some experience as a gardener can be found in every garrison, and under his direction others can be broken in to the work. Why should not the government enlist a sufficient number of expert gardeners to send one to every important frontier post? Surely the people's money is spent often to less advantage.

Good gardening consists in the execution of a well-digested plan based upon the capabilities of the location. It would be vain to attempt impossibilities; for instance, to raise Egg-Plants in an out-door garden in Oregon, or to grow a Beet-root of high saccharine quality on the alkaline plains of Utah. Nature must be consulted both as to climate and soil; this done, success is assured if the mechanical operations are well performed. It may be asked, How are army officers to know what the soil will produce till they try it? Quite true, but let the questionable crops be simply in the form of small experiments as a guide for a subsequent year, not a blind rush into the culture of everything in the catalogue of seeds to the waste of time, labor, and money, vexation, and the ridicule of others; but first a judicious selection of varieties likely to succeed, and these supplemented by others of such questionable character as would dictate merely experimental plantings. The post would, in fact, become an experimental station, and what so proper?

How should a post vegetable garden be constructed? The site should be the best obtainable with reference to soil, exposure, and topographical features. The area should be large, and everything done upon liberal and practical principles. The seeds should be all sown in drills or rows so as to be adapted to horse culture,—hand labor is the dearest of all, and should be avoided. The land, if circumstances will permit, should not be of a less length than seventy-five yards, and may with advantage be extended to two hundred, according to the quantity of vegetables required. Long lands, where animal power is used, are much to be preferred to short fields, as much time is saved in turning; for example, a plow-team in a journey of eight hours, plowing land seventy-eight yards long, spends four hours and thirty-nine minutes on the headlands, whereas were the furrows two hundred and seventy-four yards long, the time spent in turning would be but one hour and nineteen minutes. The tillage of the garden should be with the most approved labor-saving implements,—wheel-hoes for hand use, scarifiers and cultivators for horse; the seeds should be sown with hand-drills, and fertilizers of the guano class applied with similar apparatus.

It is fortunately the case that every soil holds more or less of the essential parts to vegetable growth. We will briefly enumerate them as *sulphates, phosphates, nitrates,* and *chlorides* of *potash, lime, magnesia,* and *iron.* Those that are deficient in quantity can be readily manufac-

tured at a military post,—the stable, the kitchen, the sewage, all afford matter which, when collected, will astonish by its quantity and excellence. Every post, every community, however large or small, affords enough fertilizers to most liberally manure an area of ground greater than its requirements for gardening purposes, so there need be no hesitation about fertilizers. An important question is here solved,—manure, the main-spring to success in the garden, is at hand; nothing more is needed to possess a garden than the determination to have one.

It would be out of place here to enter into the minutiæ of gardening operations. Scores of experts have written upon this subject, their works principally describing the methods as pursued by the market gardeners near New York, Philadelphia, Boston, London, and Paris. In these works full directions can be found for the more delicate methods of culture as pursued in the raising of Cauliflower, Broccoli, Egg-Plants, Celery, Mushrooms, etc. Though the situation and surroundings of market gardeners in the suburbs of great cities, expensive land, dear labor, high-priced fertilizers, excessive rent and taxes, do not apply to such gardens as we are considering, it may still be interesting to dwell a moment upon the subject of Market Gardening.

Such gardens in the vicinity of Philadelphia and New York range from a fraction of an acre to twenty acres in area, and employ about a man to the acre. The working capital of those best managed is not less than three hundred dollars per acre, and sometimes very considerably more. The expenditures per acre in producing some of the crops run up to over six hundred dollars for labor, manure, rent, seeds, and sale; which outlay is oftentimes doubly covered by the receipts.

The profits on well-conducted market gardens are such as warrant the rental of land of the assessed value of many thousands of dollars, suburban fields being most desirable by reason of limited cost of transportation. In view of such facts, what grand opportunities are presented to the officers at Military Posts, where the land, labor, and fertilizers cost nothing!

But, the Post-Garden offers as compensation for its culture something more than the mere return of vegetables. In the words of Rossmüller, "Mother-earth, with her materials, powers, phenomena, and forms of life, is to us what we call Nature. This Nature is our home, to be a stranger to which brings disgrace and injury to us all. In this conception Nature is the grand work of human culture and morals."

In the Garden an interest in the manifestations, charms, and treasures of Nature is awakened, increased, and refined. Investigation into any one of the principles of vegetable growth will develop into another, and they in time will be found so intimately connected with all the allied branches of natural science as to create a desire for further knowledge of what before were mysteries, but which the intelligence of the present age has developed into science. A well-cultivated Post-Garden

will awaken inquiry, and start trains of thought and study which otherwise would not be pursued. The close observer will desire to make microscopic observations of the germination of plants, of the growth of fungi, of insect life; and here we pause, for there is opened a volume of nature new to most men, and a source of unexpected pleasure. At the beginning of this century any investigation into the agency of insects, for good or evil, in connection with vegetation, was scarcely considered as belonging to gardening,—their eggs passed unnoticed, and the ravages of the larvæ were looked upon frequently as atmospheric blights beyond control. Now the entomologist is consulted every day by the agriculturist, and no section of the museum of the United States Department of Agriculture is more interesting than that devoted to entomology. Countries of temperate climates in an undeveloped condition support a limited number of species of insect life, and they generally harmless to vegetation, but under culture conditions favorable to their increase are presented. One of these conditions is the wanton destruction of birds, after which follow the myriad tribes of insects which feed upon vegetation,—species not alone native to the country, but brought in the course of commerce from all parts of the world. For example, the Hessian Fly was brought here in the hay used by the Hessian troops during the Revolution. The Cabbage Miller was brought first into Montreal in cases of crockery from Holland. In ten or twelve years it has extended from the St. Lawrence to the Rio Grande.

The intelligent culturist will be brought to notice the effect of various forms of potash, nitrogen, and lime; he will gradually be drawn into geological research, for he must study the peculiar features of the soil. Finally, he will find that the birds are all his co-partners in the garden, and the common tomtit or sparrow will no longer be looked upon with a careless eye by reason of his dull colors, but each one welcomed as the destroyer, annually, of millions of injurious insects. Even so the bat, ugly and of nocturnal habit, will no longer be driven away or looked upon with disgust, but regarded as a most useful ally,—thus goes on a ceaseless round of investigation till all nature is a study.

But, turning to the plants themselves, we find two forms,—the *wild* and the *cultivated*. From the earliest periods man has subjected plants to domestication, and has brought about changes in their characteristics by removal from one soil and climate to another, and by hybridization one with another. All plants, even in their natural condition, possess an inherent tendency to vary, but under domestication variability has been still further induced, and man has perpetuated such desirable forms, or *sports* as they are termed, as have come under his notice. Wild plants, unfortunately, are much more easily established in a new country than cultivated ones, and their seed possesses a remarkable vitality.

Domestication, as in the case of animals, weakens their constitutional vigor, and their further existence in desirable forms is entirely dependent upon the efforts of the agriculturist.

Plants out of place are termed *weeds*, and wherever man goes he finds himself beset by such interlopers in his garden or fields; indeed, experience has demonstrated that civilized man cannot go from one country to another without taking in his train the weeds of his native soil, which soon find a habitation among those native to the new location. The agriculturist, while presenting the most favorable conditions to the development of his crops, offers the same stimulus to the growth of weeds; and they are always ready to spring, as it were, miraculously into existence, and to grow faster than his most cherished plants. By force of circumstances he becomes interested in these pests, and two questions are constantly presented to him concerning weeds: how they got into his grounds? and how to get them out? The seeds of noxious weeds appear to be especially provided with conveniences to facilitate their distribution, some having wing-like appendages and downy coverings that the wind may waft them as it does the thistle bloom, others provided with barbs to adhere to the coats of birds and animals. The prolific character of weeds is astonishing; it has been calculated that a single plant of Purslane will in two generations produce one million million seeds. Weeds can only be eradicated by persistently fighting them. They must not be allowed to breathe; without leaves, which are the lungs of a plant, the roots will surely succumb.

Cultivated plants, on the other hand, need all the attention that we can give them; they are sports or outgrowths from other forms, and continually show a disposition to revert to a form of nature. In the day of barbarism, man, through pressing necessity, was forced to live upon such wild grains and fruits as were tempting to the eye and palate,—in fact, at times, on anything he could chew and swallow. Observation soon developed which were nutritious and which were poisonous or medicinal. Little, however, is known of the early history of cultivated plants. De Candolle, in a list of one hundred and fifty useful plants, is able only to trace the origin of one-half, and even this is doubted. It is a curious fact that not a single desirable vegetable of high development has been obtained from Australia, South Africa, the lower half of South America, or from any uninhabited island; thus clearly showing that to observant races of men are due the selection and development of useful types. In the days of the Romans the advantages of selection were well understood, though their physiological inferences were far from correct. Virgil says,—

> "I've seen the largest seed, tho' viewed with care,
> Degenerate, unless the industrious hand
> Did yearly cull the largest."

How much pleasure and valuable instruction could be imparted to the rising generation attending our public schools in the rural districts if the principles of agriculture were taught! and how practical in the development of our country would be the establishment of Government Gardens at the frontier Army Posts! In Europe they do some things better than we, notwithstanding our boasted practicability, and foremost among their advances is that of public instruction. To-day, in Austria and Sweden, there are many thousands of Public Schools having gardens attached, where are taught botany, vegetable physiology, and sometimes the whole range of science and art so necessary to a thorough understanding of vegetable growth and development. Sweden alone possesses *two thousand public school-gardens*, and there, as in Austria, the system has become so popular that all new school buildings have one room set apart as a *School-Garden Room*, where are assembled herbariums, works on agriculture, geology, agricultural chemistry, and physiology, and apparatus used by the teachers in their lectures upon plant-life.

The Public School law passed in Austria in 1869, provides that "In every school a gymnastic ground, a garden for the teacher, according to the circumstances of the community, and a place for the purposes of agricultural experiment be created." The school inspectors of each district are instructed "To see to it that in the country schools school-gardens shall be provided for agricultural instruction in all that relates to the soil, and that the teacher shall make himself skillful in such instruction." The general law declares, "Instruction in natural history is indispensable to suitably-established school-gardens. The teachers must therefore be in a condition to conduct them." Contrast this thoughtful care with the system, or rather want of system, for the finer instruction of the mind pursued in the public schools of our rural districts! In Austria the village school is the pride of the people; its surroundings are made cheerful by embellishments of trees, shrubbery, and flowers; its interior filled with a thousand things never seen here. With us, on the contrary, the rural public school is in appearance generally a disgrace to the age we live in,—shelterless, unpainted, a mere barrack, cold and forbidding in its aspect; a prison rather than a place of instruction and pleasure.

Desirable as the European system may be, it will be long before its adoption in this country; though, as an agricultural people, we need such instruction more than any other. The War Department, however, could act promptly, and in a few years establish a series of *experimental stations*, at once of national importance and of hygienic advantage to each garrison. A Post-Garden is practicable at any military station; of course, under so great a variety of conditions as presented to the soldiers of an army, each garden would differ from the other in some particulars: some upon mountain slopes, others in valleys, on plains both

fertile and arid,—all influenced by meteorological conditions of widely different effect.

Such gardens would have to conform to circumstances, and the more difficult these circumstances may be to surmount, the more pleasure in the results, both in a gastronomic and intellectual view. The labor costs nothing; enlisted men will be well employed in the garden, and they will themselves feel an interest in its perfect culture, if they see their officers and the ladies of the Post earnest students of plant-life, whether the object be a Cabbage in its homeliness, or a bed of Petunias or Portulaca in dazzling brilliancy. In view of the manifold advantages resulting from Post-Gardening, would it not pay the government to enlist capable gardeners, and detail them for permanent duty? What can be accomplished in the way of successful Post-Gardening has been demonstrated at Fort Keogh and at Fort Fetterman.

At these two points vegetables for the table, roots for the cattle and horses, and flowers for adornment have been grown in profusion, and all are happier in consequence.

Frontier stations from their very situations and conditions are not enviable places of residence, yet how much can be done to make them homelike and attractive! Flower-beds of brilliant colors in the open, hanging-baskets under porch and veranda, climbing vines over pillar and post, over fences and trees; everything ungainly made graceful, everything harsh softened by a touch of nature and art combined. Such embellishments turn the roughest structure into a home to be cherished,—one to which it is a pleasure to return after every absence.

A well-arranged and cultivated Post-Garden would soon have a wide reputation in the vicinity; settlers would view the capabilities of the soil, see successful methods of culture, labor-saving garden implements, and be thus induced to establish gardens which would minister to their comfort, making life more enjoyable, and, if flowers be introduced, elevating the thoughts and refining all who look upon them. The children of the garrison and vicinity would become lovers of nature,—the friends of trees, fruits, and flowers,—and be put on the road to be better men and women than they otherwise would. New and practical thoughts would be diffused among the people, and rational pleasures take the place of idleness and vice.

The time has come when every farmer must possess some knowledge of natural history; he must prepare himself, if he expects to follow his pursuit successfully, as much as does the mechanic or the professional man. Why should not the government establish Post-Gardens upon the most liberal scale? There is plenty of room, plenty of time, and the cost nothing as compared with results. Why should not the soldier be the pioneer of scientific and æsthetic gardening upon the frontier? He, the man of deeds, is called upon to keep sacred the

art of peace; he can inculcate in his barrack-life no higher pursuit than that of the peaceful husbandman.

The time will come when in this country, as in Europe, more attention will be paid to the practical instruction of the masses than now; our boasted Public School system, though not retrograding, has been far outstripped by that of Germany, Sweden, and Scotland, where technical education is now given instead of foreign languages and music, which unfit nine-tenths of the pupils for their after-life.

We trust we have shown how Post-Gardens can be made to pay; the compensation being not alone in satisfying the palate, but in educating the mind, instilling there those refining influences which seldom fail to lead on to higher thoughts and the noblest impulses.

BURNET LANDRETH.

BLOOMSDALE.

THE CHINESE NAVY.[1]

It is a mistake to regard the Chinese as an effete nation, not to be reckoned as a factor in international problems. The old military instincts of the mingled Mongol, Tartar, and Chinese races—the same races which, under Genghis Khan and his successors, held sway over the whole of Asia from the Yellow Sea to the Mediterranean and founded the Great Mogul empire in India—are not yet lost, and the marvelous resuscitation of China during the last eighteen years, which has been the theme of all observers, is nowhere more apparent than in the development of her military and naval strength. Shut out as she has been for ages from the rest of the world, she has not indeed shared in the great material progress of the Western nations, but her recent liberation from these superstitious shackles places her in a position where she may at once avail herself of all the results produced in other lands by centuries of invention and research.

The Chinese navy dates back to a period before the foundation of the British navy was laid under the last two Henrys. The art of ship-building has a great antiquity in China. The junks of to-day, unaltered as they are from designs dating centuries back, will compare favorably with the coasting craft of some Western countries now, and those in existence nearly three hundred years ago must have equaled in most respects and surpassed in many the barques, pinnaces, and caravals which sailed under the successors of Magellan and Andrade. The sea-going war-junks were often of large size, easily handled, and not bad sailers. Many of them had high bulwarks and pentagonal port-holes. Guns were mounted only on the upper deck, frequently on immovable carriages, and the crews had but the most slender knowledge of gunnery.

Early European travelers were often struck by the condition of the Chinese forces. Of the navy, one authority writes: "The greatest ships they have are called 'juncos,' which are very great and are made for the wars, with castles very high in the poop and prore, like to the ships of the Levant. There are so many of these that it is easy for any general of the sea to join together in a little time a navy of from five hundred to a thousand of them."

[1] Extract from the work in preparation for the press, to be entitled "The War Ships and Navies of the World," by Chief Engineer J. W. King, U.S.N.

But from the early part of the seventeenth century onward, while progress in Europe was rapid, Chinese naval architecture remained stationary. When the British first came to blows with the Chinese nearly forty years ago, their army and navy were equipped in a manner which showed that but little advancement had been made since the middle of the seventeenth century.

But when peace ensued, advantage was taken of the lessons received from their foes, and reforms were soon introduced. Not long after the Anglo-Chinese war a British officer, quoting authority on the spot, said, "The Chinese are building ships on European models for defensive objects; they are constructing their forts on better principles, and they have foreigners in their pay from whose instruction they hope to benefit in the practice of gunnery."

The effect of the British and the Anglo-French expeditions was soon perceptible in the renewed vigor with which the Chinese authorities occupied themselves in introducing improvements in their naval and military systems.

CHINESE DOCK-YARDS AND NAVAL WORKSHOPS.

What progress has been already made may be learned from a striking article in *Fraser's Magazine* last year by Captain Bridge, R.N. This writer, speaking from personal knowledge, says,—

"I have seen guards of soldiers armed with Remington breech-loaders, river junks carrying smooth-bores, and steam gunboats mounting Krupp breech-loading cannon. . . . Millions have been already spent in the construction of war steamers of modern type and in the establishment of dock-yards and arsenals in which munitions of war of all kinds may be produced. . . . Several important arsenals and gun-factories are now scattered throughout the maritime provinces of the empire.

"In 1876 a naval yard was established near Shanghai, and though there are a few Englishmen and Americans holding posts in it, the control of it is exclusively in the hands of native officials. Two steam-frigates of nearly 3000 tons measurement and five gun-vessels had been launched from it three years ago, and a small ironclad for river service completed. Of the frigates one was in commission, and the writer, who has seen her actually at sea, was allowed to go over her when lying at anchor near Shanghai. She is a handsome craft, completely armed with Krupp guns. Her crew from the captain down, without exception, is composed of native Chinamen. She did the Chinese credit in all respects. Attached to the dock-yard is a large military arsenal, in which are stored guns and small-arms of all descriptions, and in which projectiles for heavy and field guns and breech-loading rifles of the Remington pattern were being continuously produced. Heavy machinery for the manufacture of armor-

plates was being erected in a portion of the works. On the opposite bank of the river may be seen the great powder-factory, not long ago constructed for the manufacture of gunpowder of the European kind.

"But perhaps the most marked instance of progress in this direction is to be observed at, or rather near, the treaty port of Foochow. Under the authority of the distinguished Tso-Tsung-Tang, M. Giguel, an officer of the French navy, began some twelve years ago to form a dock-yard on the Min River, a few miles below the city just mentioned, which could be easily fortified. The extraordinary success which has attended his labors will be understood by some knowledge of the difficulties with which he had to contend. The very ground on which the navy-yard is formed had to be made. The soil was alluvial, formed by a thick layer of solidified mud covered with a coating of nearly liquid clay. In consequence of the freshets in the river, the level of the ground had to be raised five feet. In spite of these and other disadvantages, M. Giguel, at the end of seven years, had iron-works, rolling-mills, engine-factories, and building-slips—in fact, all the plant of a naval yard—in full working order; and had actually built the engines and, in some cases, the armament for no less than fifteen vessels, of which eleven were over 1000 tons displacement. Not only this, but a school for naval officers had been formed, and a training-ship, fitted to make cruises at sea, had been attached to the establishment.

"Even this account of several great arsenals would not exhaust all that might be said in description of what has recently been done in China to increase the efficiency of the army and navy, which she has begun to consider necessary to her well-being."

THE NEW CHINESE GUNBOATS.

The Chinese do not rely entirely upon their own dock-yards and constructors. In addition to the fleet of native production, they have recently had constructed in England a series of gunboats of the latest types, armed with the most improved and heaviest guns.

In 1876–78 four gunboats were completed at the works of Sir William Armstrong for the Chinese government, of the British "Staunch" type, designed by a member of the firm, the talented engineer, Mr. G. W. Rendel, but in which several important improvements upon that type were introduced. These boats were named "Alpha," "Beta," "Gamma," and "Delta." The first two are each 118 feet long and 27 feet beam, with a mean draught of 7 feet 6 inches, and a displacement of 319 tons. The last two are 120 feet between perpendiculars by 30 feet beam, having a draught of 8 feet and a displacement of 400 tons. They are schooner-rigged, with tripod masts, are propelled by twin-screws, and can steam 9 knots per hour.

But the increased dimensions of these last two vessels were of trivial

importance compared with the difference in their armament; for while the first two carry each a 26½-ton gun, the others carry each a 38-ton gun of the British service pattern. The mounting of these guns on vessels of only 400 tons displacement was a most daring innovation, and its boldness becomes more apparent when we remember that the only guns of the same weight and calibre then afloat were the two in the fore-turret of the great British ship "Thunderer," and that vessels of the size of these generally carried guns not exceeding 5 or 6 tons in weight, and even the "Staunch," considered a serious innovation, a gun of only 12½ tons weight.

The system of working these guns is noticeable, the piece being so much heavier than those used in the English boats, and the little vessel herself being made to act as the gun-carriage. The gun is worked by hydraulic power, and the entire arrangement of the mechanism is similar to that employed in working the 100-ton gun at Spezia, already noticed. Two heavy iron beams in the fore part of the vessel are placed side by side, on a level with the deck and parallel with the keel; on these beams are bolted frames analogous to the cross-head guides of a horizontal engine, and the trunnions of the gun are fitted in side-blocks, these last taking the place of the cross-head. Thus arranged, the gun can slide back and forth through a range of about three feet. The preponderance at the breech-end is supported by two secondary parallel bars inside the main gun-beams. These are hinged at the rear end, while at the forward end they are carried on the cross-head of a vertical hydraulic ram fixed beneath the deck. The breech-end of the gun is supplied with a hoop and lugs; the lugs rest on the two secondary bars near their hinged ends, and thus, by causing the hydraulic ram to rise or fall, the gun can be elevated or depressed at will. No turning gear is provided, the lateral training of the gun being effected by turning the whole boat through the required arc by the use of the rudder and twin-screws. To run the gun in and out, two hydraulic cylinders are used, one of which is fixed horizontally on each side-beam, the cross-heads of the rams taking hold of the trunnion side-blocks. The recoil is taken up by these rams, or, more properly, pistons, delivering water under a weighted valve. The gun is loaded by a hydraulic rammer, the shot being brought to the muzzle by a trolley or carriage, off which it is pushed into the bore.

During the trials of the "Gamma," the 38-ton gun was fired with charges consisting of 130 pounds of powder behind an 800-pound projectile, the elevation being 3½ degrees. The initial velocity was 1500 feet per second, and, as tested at Shoeburyness, capable of penetrating 19½ inches of iron in three thicknesses, sandwiched with 10 inches of teak. In addition to the heavy guns, two 12-pounders are also carried, and a machine-gun of the Gatling type.

These vessels are iron-built, and each carries 50 tons of coal and 50

rounds of ammunition. They all made successful passages to China, the first two being delivered at Foochow in 1876, and the last two at Tientsin in 1878.

But the Chinese did not stop with the construction of these four boats. Four more, built on the Tyne under the supervision of the Elswick firm, and armed each with a 35-ton gun of the Armstrong new type, sailed from England in July, 1879, for China. These boats, or "floating gun-carriages," are substantially of the same design and construction as those which have already been described. The most important difference is that they are built of steel instead of iron, and are double-ended, the stern and bow lines being after the same model, and are fitted with bow rudders, which enable them to steam either backward or forward. The bulwarks have been heightened to give additional cover to the men.

These vessels were originally designated "Epsilon," "Zeta," "Eta," and "Theta;" but these names have since been changed to the less euphonious appellations of "Chin Pei," "Chin Nan," "Fei Ting," and "Lung Lang." The principal dimensions are:

Length on the water-line	125 feet.
Breadth, extreme	29 feet.
Depth of hold	12 feet 3 inches.
Mean draught of water	9 feet 6 inches.
Displacement	440 tons.
Indicated horse-power, maximum	389 tons.
Speed, loaded	10 knots.
Coal-bunker capacity	70 tons.

The motive-power consists of two pairs of compound, direct-acting engines, working twin-screws, making 10 knots per hour going ahead and 9 knots backing. It will be evident that peculiar strength of structure and economy of space have been required for the placing within so small a compass of weights so large as a whole and so abnormally localized. Great care was necessary in this regard to secure steadiness and stability for the gun platform, as well as to reduce the strains and diffuse the recoils throughout the entire boat. The hull is divided by four transverse water-tight bulkheads, and also by a longitudinal central bulkhead forward of the engines. The engines, boilers, magazines, and shell-room are all under the water-line, and there is a horizontal under-water deck over the latter.

As has been already stated of the boats first built, the dominant feature is the gun. This is of the new Elswick type, 11-inch, 35-ton, muzzle-loading, and of the chambered pattern. But while the calibres and weights of the new guns are less than the 38-ton, their power and range are enormously increased, and they have a superiority in penetrating power of 15 per cent. over the 38-ton, which latter was the

heaviest weapon afloat in Europe at the time the Chinese boats sailed from England. This superiority is obtained by the marvelous powder charges which they burn, these being 235 pounds, or 35 pounds more than the heaviest experimental charges which have yet been fired from the British service 12½-inch 38-ton gun mounted on board the "Dreadnaught." The gun is 4 feet 9 inches longer than the 38-ton, its bore is 21 feet 4 inches in length, and it is chambered for a length of 57 inches, giving 34 cubic inches of space for every pound of charge. Its range has been calculated up to 7500 yards, the elevation for which is 10 degrees 26 minutes. The following table will exhibit a trustworthy comparison between the two weapons:

	Gunboats.	Dreadnaught.
Weight of gun	35 tons.	38 tons.
Calibre of gun	11 inches.	12½ inches.
Charge	235 pounds.	160 pounds.
Weight of projectile	536 pounds.	818 pounds.
Initial velocity, per second	1,820 feet.	1,495 feet.
Muzzle energy, total	12,311 foot-tons.	11,727 foot-tons.
Muzzle energy, per inch	358 foot-tons.	308 foot-tons.
Penetration of iron at 1000 yards	17 inches.	15½ inches.
Elevation at 1000 yards	39 minutes.	1 degree 34 minutes.

It will thus be seen that by the reduction of 282 pounds in the weight of projectile, and notwithstanding the excess in the cartridge, a clear gain of 207 pounds by way of reduced weight per pound is made. The 35-ton gun has superior velocity and energy, also greater range at given elevations, which is of great moment in a naval gun where a man-of-war is required to bombard a town of high elevation, or reach an enemy escaping into shallow waters.

It will thus be seen that China, the "effete" nation of the East, but just entered in the race between modern naval powers, has already actually put to sea more powerful guns than has any other nation on the globe; for the English "Inflexible" and the Italian "Duilio," carrying 80-ton and 100-ton guns respectively, are not yet ready for service; while the heaviest guns now mounted afloat by the French, Germans, and Russians, though of greater weight, burn smaller charges and have less power than the guns on board these gunboats.

The heavy gun is mounted forward, and in addition two 12-pounder breech-loading guns are placed astern, also two 10-barreled Gatlings of .45-inch calibre, to be fired from various positions. Each of the heavy guns was tested on board the boat up to the maximum charge and weight of projectile, and up to 10° elevation, the greatest recoil being 4 feet 9 inches, and the numbers of men to work, load, and control the gun with comparative ease being 5. The complement of crew, exclusive of officers, is 27, and the coal-supply is sufficient for six days' steaming in smooth water.

The cost of the "Chin Pei," including hull, machinery, and rigging, all complete, ready for sea, was $170,100.

These boats are primarily intended for coast defense, and if properly manned will no doubt give a deal of trouble to Japan or any other nation which may dare to invade the sanctity of Celestial waters. Extravagant estimates, however, of their merits have been formed. They are a long step in advance, and for special service valuable additions to a fleet, but they are not likely to revolutionize naval architecture. As at present constructed they are not free from objections, one of which is the want of lateral movement of the gun without movement of the vessel, particularly in rivers, where otherwise such craft would be especially serviceable. Besides this, they have not the speed to escape from an armored ship, and to operate with maximum efficiency the water must be tolerably smooth, and at such times it would not be difficult with well-directed shots to send one to the bottom. However, if the Chinese government intends to go on building these armed wasps as it has begun, it will probably in the end attain all the necessary movements of the gun, and what is still more important, high speed.

OTHER VESSELS.

In addition to the vessels already described, there have also been built in England for the Chinese navy eight small gunboats, of from 100 to 220 tons displacement, each carrying from 2 to 7 guns.

At the Foochow arsenal there have been built seventeen composite gunboats, each mounting one 7-ton or 9-ton gun with other light pieces, one composite corvette, carrying 11 guns, one of 11 tons weight, and three transports. There are also the two wooden frigates and the five gun-vessels already mentioned as constructed at Shanghai. All of these vessels are now doing duty in southern waters.

In addition to these gunboats, the Chinese have determined to still further equip themselves for coast defense by providing a supply of torpedo-boats, and the first of the series proposed, an experimental boat, was shipped from England to China in August, 1879. Its dimensions are as follows: length, 52 feet; breadth, 7 feet; mean draught of water, 3 feet 6 inches; maximum speed, 16 knots per hour. It is built of steel, is divided by six water-tight compartments, and is arranged to work three spar-torpedoes.

The Chinese authorities have also taken the initiative step in the formation of an ironclad fleet, by ordering from Messrs. Mitchell & Co., on the Tyne, England, a doubled-turreted steel armor-clad, to have a speed of 16 knots, the machinery to be built by Hawthorne, of Newcastle.

J. W. KING,
Chief Engineer U.S.N.

UNSINKABLE SHIPS.

HAS not the time come to lay aside the cumbersome and unseaworthy ironclad? and is not the day near at hand for the construction of unsinkable ships, protected with armor around only their vital parts?

Though it is not the wish of this great country to have a large and expensive cruising fleet, still we should guard against an emergency, and be at all times moderately well prepared. To do this, it is necessary to have a few vessels fit to take the sea, and if necessary hold in check an enemy's fleet—on the breaking out of hostilities—until our shipwrights could construct vessels able to cope with an adversary, and have a fair prospect of success.

The "Virginius" excitement showed how little the country was prepared to demand redress for wrongs committed; and now that the fight between armor and ordnance has culminated, and ordnance won, we should no longer delay, but commence the construction of a few first-class ships of war, to be armed with heavy breech-loading rifled ordnance. Torpedoes may do their work in the defense, but our late war showed how easily fleets could run them, and that, too, in the face of a heavy fire from shore batteries. The war of the Rebellion was the father of ironclads, and Europe, no less alarmed than ourselves, was compelled to build large ironclad fleets; and as one country advanced, another country soon followed in the competition of building ship against ship. This demand for shot-proof vessels, urged on by the armed condition of Europe, produced nearly every conceivable kind of ironclad, most of them now great failures, as their sides are so easily penetrated by heavy ordnance, not to speak of their being deficient in sea-going qualities. The original "Monitor" was a success for a time, but were she now afloat, would be perfectly useless except for harbor defense. And the same may be said of many ironclads in Europe,—only fit to take the place of the old line-of-battle ships,—as they now fail to do what was expected of them, owing to the great advances made in ordnance. In the beginning, armor on the earliest ironclads was about four and a half inches in thickness, and this was then quite sufficient, when the 64-pounder was esteemed the heavy gun; but since then the increased thickness with backing has grown to nearly four feet,

and the 64-pounder smooth-bore has become a 1760-pounder rifle. As ordnance increased in size armor-plating increased in thickness to keep pace with the gun, making the ironclad so unwieldy that she is more dangerous to friends than to foes.

Until a short time ago armor and ordnance kept fairly together, but the gun has outstripped its rival, and we are at a stand-still in the defense, considering the serious factor in the calculations of the additional displacement caused by the additional weight of armor. Limited as the knight of old was in the weight of armor, and finding this extreme limit of thickness easily penetrated, his armor was thrown aside as worthless; and so it will be with the man-of-war, having reached this limit of carrying power with her armor so easily pierced, she must eventually cast off the plating and go fighting light.

The defenseless condition of man in his natural state at first suggested the idea of armor for protection to the body. The shield may be taken as the first weapon used in the defense; then followed the breast-plate and helmet, and finally a complete suit of armor, which was gradually increased in strength and weight, till at last it was found to be an encumbrance.

The knight of the sixteenth century was strong and secure within his armor, but once unhorsed, and the weight placed him at the mercy of an enemy. About 1485 the armor of the English knight had attained great perfection, and it was about this time that the art of defense had far surpassed the art of offense; which is quite the opposite condition of affairs, as they are now presented to us, four hundred years later. The application of gunpowder to the purposes of war and the improvements in fire-arms changed all this, causing armor to gradually disappear, and at the end of the seventeenth century only portions were retained; and will not this be the fate of the armor of the man-of-war at the close of the nineteenth century?

Armor limits the number of guns and gives a ship great top-weight, and the moral effect caused by the bursting of a shell in a turret or battery is very great, creating much confusion and causing great loss of life. This was shown in the late capture of the "Huascar," when, by the bursting of a shell in her turret, half the battery was rendered useless, and many of the officers and crew killed. The great draught of water, loss of speed, great weight to support, and want of seaworthiness as well as handiness, combined with the inability to keep out an enemy's shot and shell, must eventually decide the fate of the monster ironclad.

The great Farragut said ironclads are cowardly things, and he actually preferred being outside, exposed to the enemy's shot, to being behind iron walls. It was as late as last August that the 100-ton Armstrong gun at Spezia, Italy, penetrated a target of twenty-seven and one-half inches of steel and one inch of iron,—this was backed by twenty inches of oak; later, Herr Krupp's steel gun, firing a projectile

of seventeen hundred and nine pounds, had a calculated penetration of thirty-two inches of armor; and later still, the 80-ton Woolwich gun, carrying a projectile of seventeen hundred and sixty pounds weight, attained a greater muzzle velocity than the Krupp gun, and consequently greater penetration. In the face of these experiments, with the Italian navy about to arm one of their vessels with two 120-ton guns, the construction of the contemplated 200-ton gun, firing a charge of nine hundred and fifty pounds of powder, and throwing a projectile of six thousand pounds weight a distance of twelve miles, is but a question of a few years. May it not be asked, What kind of a monster would you build to carry the thickness of armor now required to keep out such heavy shot and shell?

In the race ordnance is so far ahead, that the question arises, Can we not at once do away with the greater part of the armor of the sea-going man-of-war, and commence the construction of sea-going ram and compartment ships with great driving-power?

The success attained shortly after our late war by one of our war vessels, placed us in the front rank for the construction of fast models; though it might well be asked, Have we made any advance in their sea-going and other qualities?

Strange to say, one of the best sea-going vessels in our navy to-day is the "Wyoming," and she is about the same proportions as Noah's ark,—six to one,—with no water-tight compartments in her, as there is no reason to believe the ark had any, though later we know that the Chinese had them in their junks.

Protect the engines and boilers if you will, and let us have unsinkable ships; vessels that will float, though the dreaded torpedo does all that its advocates claim. Let them have great speed and a ram, and be armed with the best breech-loading ordnance now produced. Can it be denied that the English and French governments are now taking a serious view of the great advantages possessed by the unsinkable ship?

The cry is less armor, more buoyance, and great speed, with the maximum of bow and stern fire: though the advantages of the latter are not yet apparent over broadside ships with plenty of guns. Of a class of vessels now building in England, the "Constance" has water-tight compartments, the compartments part of the ship's accommodations, also bulkheads to keep out a raking fire. This vessel is two hundred and twenty-five feet long, forty-four feet six inches beam, drawing twenty-one feet six inches of water, and is armed with a ram and bow and stern guns.

A vessel like this one, with her vital parts protected and nearly the same draught of water, could probably be built for one-third the cost of the monster ironclad. Then we could build two sea-going ships of the same type with great speed, and a sea-going ram,—the three for the

cost of the large ironclad,—and that they together could fight and beat any ironclad now afloat who can gainsay?

England, though loath to give up the large ironclad, will eventually accept the inevitable and fall back to ships that are easily and rapidly handled, which is readily attained in short and lighter-draught vessels. The lead already taken by the better cruiser, armed with a ram and plenty of guns, possessing the requisite sea-going qualities,—with the steering-gear well below the water-line,—is an advance that will soon compel all maritime nations to follow.

In France there is now nearly completed for the French government the "Amiral Duperré." In this vessel the hull has a double bottom, and is divided into two parts by longitudinal bulkheads, and contains nearly two hundred water-tight compartments and cells. She has twenty-two inches of armor to protect her machinery and magazines, and has also turrets, but is without armor to protect her fourteen rifled broadside guns.

Anticipate the war-ship of the future by building a compartment vessel of sixteen-knots speed, with sail-power to drive her from eight to twelve knots; boiler and engines well protected, and armored with a ram and the latest breech-loading cannon. Build her of wood or steel; and now that the ram and torpedo have taken such prominent places in the sea-fight, let the leading feature be great buoyancy, and enough reserve of floating-power to sustain her in a crippled condition. What a ship will do in a crippled state has just been shown by the ocean steamer "Arizona," of the Guion line, lately in collision with an iceberg,—a grand illustration of the qualities possessed by a properly constructed compartment vessel. On the other hand, we hear of the German man-of-war "Grosser Kurfurst" disappearing in about eight minutes from the time of being struck by the ram of the "Kŏnig Wilhelm." And again, the English man-of-war "Vanguard" sinking in little more than an hour after a collision; and in this vessel only her outer skin was pierced, the inner skin remaining intact.

The arrangement of the twin-screw adds so much to the turning-powers of ram-vessels that it must be preferred to the single screw and rudder combined in one, besides the light draught thus allowed and the necessary speed so useful to these vessels to protect them from the dangers to which they are exposed in action. Though the weather-roll may immerse the weather-screw and a ship be thrown in the trough of the sea, still a good helmsman could anticipate this as he does other movements of a ship's head.

Unsinkable ships, armed with a ram and breech-loading rifle ordnance, fit for peace or war, must eventually take the lead as a class of vessels able to meet the great demands of our service.

C. T. H.

WASHINGTON, December, 1879.

EDITORIAL NOTES.

One of the distinguishing characteristics of our military and naval service is the lack of official recognition of acts of extraordinary heroism in battle, or of exceptionally meritorious services in or out of the line of duty on the part of individual soldiers and sailors. In almost, if not quite, every European service, such acts are usually recognized by the bestowal of a medal or other decoration upon the deserving one; and however trifling such an acknowledgment may be intrinsically, it is at least a substantial token of appreciation which far outweighs and long outlasts all the high-sounding but ephemeral expressions that could be uttered upon the occasion. It may be asked now, as it has been frequently asked before, Why do we not bestow such a reward, like the Victoria Cross of Great Britain, the Iron Cross of Germany, upon our private soldiers and sailors who show themselves, in action or otherwise, to be worthy of the honor? Experience in foreign services has proven that these rewards are the greatest possible incentives to the men to endeavor to earn them, and have exercised an incalculable moral effect upon those who have won them, and, through those honored ones, upon the service as a whole. What is thus true in foreign services would be equally so in our own. It is neither justified nor consistent to say that this bestowal of medals upon the men would be undemocratic; that it would soon lead to the bestowal of titles upon the officers, followed by the adoption of monarchical customs generally in the two services and thence into the government. Such a fear is too puerile to be seriously considered. As a simple matter of fact, our government and many of our societies now present medals and other testimonials to individuals for life-saving and other services; yet no one thinks of questioning the propriety of such petty rewards, or of expressing any fear as to the consequences. Our soldiers, sailors, and marines are certainly entitled to as much consideration for particularly meritorious acts as private individuals are, and it is a positive injustice to deny it to them. If it be said that they are paid for doing their duty, we may add, so are all others; but it must be remembered that *exceptional* services are always justly entitled to exceptional recognition. We trust that those in authority will give this subject their early and favorable consideration.

THE labor riots of 1877, direful as were the events that marked their history, and terrible as were the possibilities which were suggested by their occurrence, may yet prove to be—as many a seemingly unmixed evil has been—a blessing in disguise. In so saying we refer to the unmistakable change for the better which has taken place within the last two years in the organization and training of the militia in many of the States, and which is directly traceable to the experiences of the eventful summer of the year mentioned. As the Army of the Potomac had its Bull Run before it became the strong, coherent body which at last wreathed itself with the laurels of victory, so have the militia of the States had their Pittsburg to warn and to enlighten them. All who appreciate the liberty which they enjoy through law, and who recognize the fact that disciplined and regulated force is the ultimate of law, must rejoice to observe that the lessons of 1877 have not been wholly lost. In a former number of THE UNITED SERVICE we commented with approval upon several particulars in which the militia has recently manifested progress, and to what we have already said we wish now to add an expression of our gratification at the attention which is being given to the matter of inspection, without which no military body, regular or militia, can ever attain a marked degree of efficiency. The military system is a hierarchy, and rests on the idea that each individual of its component parts acts under a superior. Independence of action is not predicable either of the individual man or of individual bodies, but from commander-in-chief to private, from division to platoon, the principle of subordination prevails. And such a system can be kept in effective form only by means of inspection. To see is to know. Either his own, or the eyes of his representative, must take in the actual condition of the troops he commands if an officer would know their fitness for service. Left to themselves, the best officers and the best troops will degenerate. To have the whole body instinct with life and vigor, the healthful tonic of thorough and frequent inspection is absolutely necessary.

THE weakness for military titles, which is popularly supposed to be peculiar to Americans, is, it may be said, quite as conspicuous among foreigners as among ourselves. Those who claim that we have more than our share of "majors," "colonels," and "generals" are evidently ignorant of the fact that we have no more in proportion, all things considered, than any European people. One thing must be borne in mind which will explain the apparent excess of these titles: we but recently emerged from a war unexampled in its proportions, in the course of which the vast majority of our officers fought for and honestly earned their actual or brevet rank, so that it is not only unreasonable, but it is most unjust, to ridicule titles thus nobly earned. That many claim

these titles who have no right to them is true; but it is equally true in every foreign country. As for brevets, we do not surpass, if we equal, even the British in this respect, they having as many brevet lieutenant-generals, for example, as we have brevet brigadier-generals in our regular army. As for militia titles, we have no more than they have abroad, proportionately, and it is only recently that they had quite an animated controversy in Great Britain upon the claims of volunteer and militia officers to receive the social and official recognition due to their rank.

In view of the comparatively defenseless condition of our coast from hostile attack in case of war, the attention of Congress cannot be devoted to the subject too soon. As it is, our present defenses are worse than useless, because they are confessedly ineffective against foreign means of offense, whereas, if we did not have them for show, Congress might be impelled to appropriate the means for providing effective ones. Any of the principal European nations might send a fleet over here which could lay every one of our coast cities, from Maine to Texas, in ashes in a few hours, without receiving a shot in return from us. Take New York for example: the largest gun in the fortifications of her harbor throws a shot weighing four hundred and fifty pounds a distance of four and a half miles, while the largest ironclads of Europe throw shells weighing two thousand five hundred pounds a distance of nine miles (Krupp's latest gun has a range of fifteen miles), so that those vessels could remain out in the open sea, far beyond the reach of our pop-guns, and drop their missiles in the heart of New York and Brooklyn, destroying more property in one day than would pay for properly arming every fortification on the Atlantic and Pacific coasts. Even our torpedo system, admirable as it is, would be of no value in such an extremity, because, as shown, hostile vessels need not enter our torpedo-protected harbors to accomplish their destructive work. The declaration that there is no immediate danger of a foreign war, and that when one threatens there will be ample time to prepare for it, is the expression of national madness. A heavy piece of ordnance, such as an 80-ton gun, requires many months for its manufacture, and several months additional for testing and mounting in position, so that a foreign war might not only threaten, but might break upon us and sweep our whole coast clear before we could make a single one of the several hundred guns needed to protect ourselves. Whole pages might be written to prove the supreme importance of this subject to the country, but all that can be done here is to call the attention of the press and people to it, in the hope that they will urge upon Congress the necessity for prompt and liberal action in the premises.

SERVICE LITERATURE.

CAPTAIN T. SCOTT FILLEBROWN, U.S.N., has been ordered to Washington to collate the official reports, etc., made to the Navy Department during the civil war, and the result of his labor will appear in due time in book form.

A "CENTENNIAL MEMOIR OF MAJOR-GENERAL JOHN SULLIVAN, 1740–1795," by Thomas C. Amory, has just been published in pamphlet form.

REAR-ADMIRAL DANIEL AMMEN'S book on "The Interoceanic Canal," published by L. H. Hamersly & Co., has met with unexpected favor among those who are interested in the subject, both at home and abroad, and has done much to influence the scientific world in favor of the Nicaragua route, which the admiral favors.

GENERAL SIR GARNET WOLSELY is writing a life of the Duke of Marlborough. The general is now engaged in a somewhat spicy controversy with Dr. Russell, the newspaper correspondent, who severely criticises the former's management of affairs in the South African war.

MR. FRANCIS PARKHAM is writing a biography of General Montcalm.

IN answer to numerous inquiries as to the authorship of the articles entitled "Whiffs from an Old Sailor's Pipe," which have attracted flattering attention in the pages of this magazine, we have to state that we are not at liberty to give the name of the author, but we can say that they are from the pen of a naval officer who is high up on the active list.

A PARIS letter to the *New York Herald* says, "The edict which General de Cissey issued in 1872, prohibiting officers from publishing any book or essay without leave from the War Office, has had the effect of putting an almost complete stop to military publications."

CHIEF ENGINEER J. W. KING, U.S.N., has now in press, and will soon publish, a work on "The War Ships and Navies of the World."